

ALL INDIA FOOD PRESERVERS' ASSOCIATION

INDIAN FOOD PACKER



ZENITH

your salesman at the point of purchase

Upto a certain point every good product sells on its merit. But the market is flooded with equally good products, each hoping for the same thing: Sales appeal. Here's where Zenith containers play a vital role. Well-known for their superb workmanship and eye-catching appearance, Zenith containers are your salesmen at the points of purchase. ZENITH manufactures open top cans,

lithographed containers, pillar-proof closures, collapsible tubes, metal trays and spray pumps according to customer's specifications.

WINNERS OF SEVERAL AWARDS

FOR TIN PRINTING:

**ZENITH EXPORT AND EARN
FOREIGN EXCHANGE.**



**ZENITH TIN WORKS
PVT. LTD.**

Bombay-34.

Tel.: 370375 Grams: 'ZENITHTIN'



Editorial Board

1. DR H. A. B. PARPIA
2. DR G. S. RANDHAWA
3. DR B. L. AMLA
4. DR P. K. KYMAL
5. DR H. NATH
6. DR D. V. REGE
7. DR P. B. RAMA RAO
8. LT. COL. O. P. KAPUR
9. SHRI K. C. DÉ
10. SHRI O. P. DANG

MARCH—APRIL 1977

Vol. XXXI

No. 2

CONTENTS

1. Editorial	3
2. Assessment of Rourkela Electrolytic Tin-plate for Canning Fruit and Vegetable Products	5
3. Studies on the Occurrence of White Patches in Canned Pineapple Their Causes and Control Measures	12
4. Varietal Trials in Canning of Pineapples	18
5. Caramel Colour	26
6. Studies on Peanut Butter—A Feasibility Report and Varietal Trials	36
7. Effect of Ripeness of Tomato on the Colour of Ketchup	42
8. Book Reviews	51
9. Notes and News	58
10. Export News	66
11. Foreign News	75
12. Trade Marks	89
13. Government Notifications	90
14. Men and Companies	97

MARCH—APRIL 1977

Indian Food Packer

Post Bag No. 1676 : Bangalore 16

Journal of the All India Food Preservers' Association

Established 1946

Regd. No. R.N. 7643/57

(Published Bimonthly)

President

D. D. DESAI

Saras Foods, Nadiad, Gujarat

Vice-President

V. L. SHARDA

Tims Products Ltd.

Belgharia, Calcutta-56

Chairman

B. R. MALHOTRA

Weikfield Products Company

(I) Pvt. Ltd., Poona 14

Hony. Secretary

Y. K. KAPOOR

Northland Industries, New Delhi-55

Convener, Technical Advisory Committee

LT. COL. O. P. KAPUR

Central Food Technological Research Institute, Mysore-13

Editor

V. B. OBEROI

Kissan Products Limited, Bangalore-16

Subscription : Rs 25 per year, Foreign Stg. £ 3.00, \$ 7.00; Rs 5 per copy, postage free.

Advertisement Rates

	Rs.
Art paper	400
Full page	300
Half page	180
Quarter page	100

MACHINERY AND EQUIPMENT FOR FOOD PROCESSING PHARMACEUTICALS AND COSMETIC INDUSTRIES

1. B. S. B. Double Seaming Machine
2. B. S. B. Reforming Unit
3. DK-65 Double Seaming Machine (Canstill)
4. Pulpers for Mango and Tomato
5. Peas Haulers
6. Peas Grader Rotary Type
7. Peas Punchering Machines for Dehydration
8. Orange Peel Shredding Machines
9. Rossing Machine
10. Exhaust Boxes
11. Steaming Jacketed Pans
12. Flang Rectifiers
13. Can Tester
14. Retorts
15. Mixing and Storage Tanks
16. Hydraulic Juice Line
17. Vacuum Filler
18. Can Filler

Available From Ex-Stock

SEAMING ROLLS

SEAMING CHUCKS

All Sizes For: MB, IA, MB, DS, 24

Lubeca-Lw 210

B. S. B.

DK-65 DOUBLE SEAMERS

Contact: Phone: 561105

B. SEN BARRY & CO.

65/11 Rohtak Road

Karol Bagh

NEW DELHI-110 005



Presenting MILPRO.
The only protein-calorie balanced drink
that bridges the 'food gaps'—deliciously!

The 'food gaps'

The 'food gaps' happen to you between meals. Like the gap you feel between breakfast and lunch, or between lunch and dinner... So you reach for a cup of tea or coffee, or for a soft drink. But these are mere fillers with little food value—if any. Starting today, keep on the go with Milpro. It bridges the 'food gaps'—deliciously! And gives you nourishment your daily diet may not provide.

Proteins and calories balanced

Milpro contains important elements for health and vitality: **Proteins** to renew body tissue and form red blood cells. **Calories** for hours of energy. **Vitamins A and D** to help build strong bones and teeth. Vitamin A is also vital for good complexion and good eyesight... All this and more—in every bottle of Milpro.

Three flavours

Milpro comes to you in three flavours. Elaichi. Vanilla. Pineapple. All so delicious, you'll ask for more! Drink Milpro on its own, hot... or cold. Combine it with cornflakes, fresh fruit, porridge. Have it any way you like, every day, right round the year.

Made by the House of Tata, Milpro guarantees excellent quality. Every time.

Tata's Milpro
Drink It Hot...Drink It Cold.

**Coca-Cola is consumed
and enjoyed around
the world in more than
137 countries.**

**The quality you
can trust—
anywhere,
anytime.**



**It's the real
thing.**



"Coca-Cola" and "Coke" are the registered trade marks which identify the same product of The Coca-Cola Company

Editorial



Success of a Food Processing Industry depends upon competence of its management at every level of operation from production of raw materials to harvesting, pre-packaging and transport to the processing plants, productivity and high quality finished goods to meet the consumer satisfaction. The entire manufacturing programme has to be based on a sound marketing and consumer servicing policy. A multi-disciplinary training is fundamental to developing systems approach for successful commercial operation that would take into consideration the objectives of national and social development.

As the success depends upon the competence of men and their functioning as a team, the quality of training given to them has to be based on the specific requirements. They should not only be theoretically sound, but have practical experience. Such a pro-

gramme of development could best be developed as a joint effort of Industry and the institutes involved in training of personnel. So far, there has been stress on training of technologists. Effort has been made to give them a background of plant operation and industry costing. What is needed in the country is the designing of special course which would not only take into consideration practical aspects of each stage of operation at the factory, but also training in management of raw materials, processing plants, marketing, finance utilisation and of bringing out the best from the personnel working under them. This type of training must give special attention to building of young entrepreneurs capable of taking decisions at every crucial moment. The operation of industry, specially at the small and medium scale level could be improved substantially by training of personnel.

FRESH ORCHARD PLUCKED

MANGOES

ALPHONSO

BENGANPALLI

TOTAPURI

NEELAM

Suppliers of All Varieties of
MANGOES

in Bulk Quantity to the Canning Industry
Throughout the Country

ALSO

Can arrange supply of 100 per cent
natural pulp in any quantity of
MANGO, ORANGE, PINEAPPLE, etc.

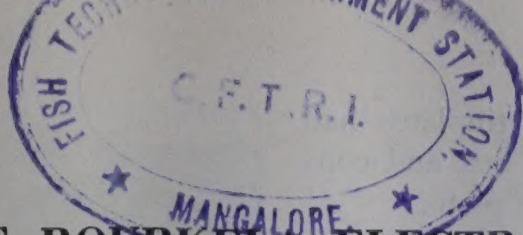


FRUIT SUPPLIES CORPORATION

91-92, GUNDOPANTH STREET, BANGALORE-560 002

Gram: **MILANSAR**

Phone: **28909**



ASSESSMENT OF ROURKELA ELECTROLYTIC TINPLATE FOR CANNING FRUIT AND VEGETABLE PRODUCTS

M. MAHADEVIAH, W. E. EIPESON, R. V. GOWRAMMA AND L. V. L. SASTRY

(Central Food Technological Research Institute, Mysore-570013)

Abstract

Suitability of three types of Rourkela electrolytic tinplates having different grain size structure of tincoating was investigated for canning fruit and vegetable products. Rourkela electrolytic tinplate having grain size structure equivalent to or larger than ASTM No. 9 compared well with imported electrolytic tinplates and found suitable for canning most of the fruit and vegetable products tried.

Introduction

During World War II, due to shortage of tin, a great deal of attention was directed to economise the use of tin for the fabrication of open top sanitary cans for the food processing industry. One major outcome of this was the development of electrolytic tinplate to replace hot dipped tinplate which carries heavier coating of tin. Electrolytic tinplates of 0.25, 0.50, 0.75 and 1.00 lb. per base box are available.

In India, upto 1967, imported hot dipped tinplates with tincoating of 1.5 and 1.25 lb./base box were being used for canning fruit and vegetable products. Thereafter imported electrolytic tinplate with tincoating of 1 lb./base box was introduced. It is estimated that during 1977 about 10,000 tonnes of tinplate will be required for canning fruit and vegetable products. This will be much more when other processed food products are considered and will involve a large amount of foreign exchange.

Experiments were undertaken by Mahadeviah *et al.*¹ to find the suitability of different types of hot dipped tinplate with tincoating of 1.25 lb./base box manufactured at

Rourkela Steel Plant, Rourkela. Hot dipped tinplates with phosphorus content of 0.02 and 0.025 per cent in the base plate were found to be suitable for canning both fruit and vegetable products, while tinplate with 0.03 per cent phosphorus in the base plate could be used for mildly corrosive products like vegetables.

Now the facilities are available at Rourkela Steel Plant for the manufacture of electrolytic tinplate using cold rolled steel plate. Therefore experiments were undertaken to find the suitability of Rourkela electrolytic tinplate with different grain structure of tincoating and compared with imported electrolytic tinplate having large grain size structure. The results of this investigation have been presented in this publication.

Experimental

Tin containers: Different types of imported and indigenous electrolytic tinplate manufactured at Rourkela steel plant having different grain size structure of tincoating were fabricated into cans by M/s Metal Box Co., Calcutta and M/s Poysha Indus-

trial Co., Bombay. All the tinplates had 1 lb. of tincoating per base box and conformed to M. R. quality steel plate.

Products packed: The following fruit and vegetable products were canned under factory conditions following the standard methods for processing.

Plain cans :

- | | |
|--------------------------------|---------------------------|
| 1. Pineapple slices in syrup | |
| 2. Mango slices in syrup | } Moderately
corrosive |
| 3. Mango juice (35% pulp) | |
| 4. Ivy gourd (Kundri) in brine | Highly
corrosive |
| 5. Potatoes in brine | Mildly corrosive |

A.R. Lacquered cans: Grapes in syrup

S.R. Lacquered cans: Cabbage in brine

Cut-out examination

Six cans were selected at random from each lot for cut-out examination. The following particulars were included in the examination: external appearance of the cans, loss of vacuum, examination of the interior surface of the cans for detinned spots/patches and sulphur staining, organoleptic quality of the product with respect to appearance, colour, texture (in the case of slices) and flavour, pH, acidity, total soluble solids, dissolution of tin in plain cans and iron in lacquered cans.

Methods of analysis

Porosity and iron solution value: Porosity of the tinplate was determined by the thiocyanate test and iron solution value by modified thiocyanate test³.

Grain size structure of tincoating was observed by immersing the tinstrip for about 3 min. in a solution containing 100 g ferric chloride and 0.5 to 1 g of sodium sulphide in one litre of water and compared with ASTM numbers (plate 1)⁴.

Thickness of tincoating: Total thickness of tincoating was determined gravimetrically by Clark's test³.

Corrosivity of tinplates: The Alloy Tin Couple test (ATC) developed by Kamm

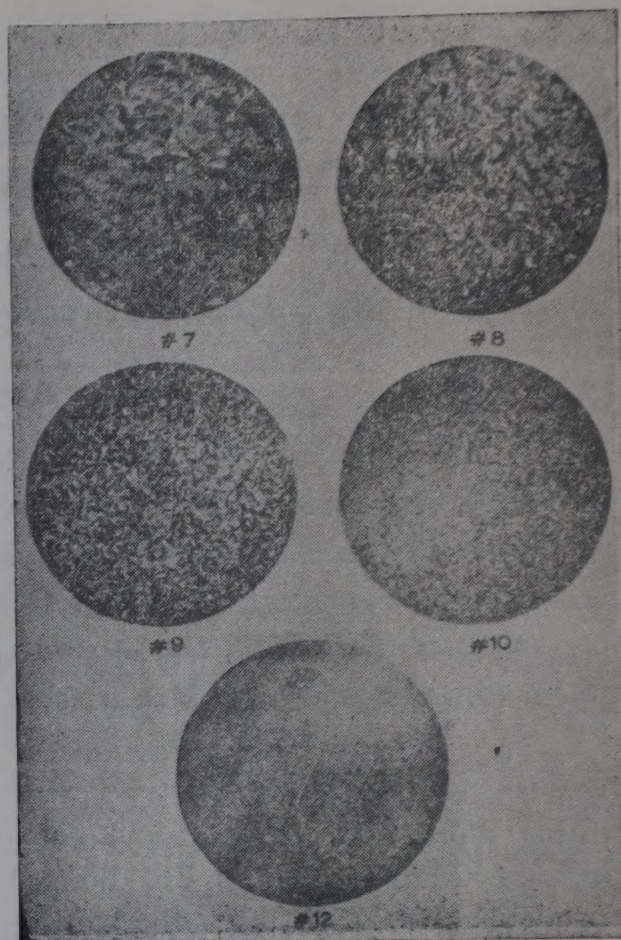


PLATE 1. ASTM numbers for grain size structure of tincoating

*et al.*⁵ was used to find the corrosion behaviour of different types of tinplate after removal of free tin layer.

Pickle lag value: This was determined following the method described by Hoare and Britton³. Tincoating was removed by Clarke's Method followed by immersion for 30 sec. at 90°C in 10 per cent sodium hydroxide to which sufficient hydrogen peroxide was added periodically to maintain oxygen evolution. Test specimen was immersed in 6 N hydrochloric acid at 90°C and the time which elapses before a steady rate of iron dissolution or hydrogen evolution was measured.

Tin and iron content: Juice was directly taken, but the slices were blended along with the covering liquid (syrup/brine) for analysis. The sample was mixed with

fusion mixture consisting of potassium dihydrogen phosphate and magnesium nitrate to prevent the volatilization of tin during ashing⁶. Ashing was done in a muffle furnace at 550°C and tin was determined by the volumetric method described by McKenzie⁷. For the determination of iron, ashing of the sample was done without using fusion mixture and determined by Wong's method⁸.

Results and Discussion

Physical characteristics of tinplate

For standard electrolytic tinplates, the grain size structure of tincoating has been suggested to be equivalent or larger than No. 9 by ASTM⁴ (American Society for Testing and Materials). Grain size structure of different types of tinplate used in these experiments has been incorporated in Table 1. Grain size structure of Rourkela III tinplate was smaller than No. 10 and the grain size structure of other tinplates was within the specified limit. Porosity, alloy tin couple (ATC) and iron solution values increased with decrease in the grain size structure. Pickle lag and ATC

values of Rourkela (III) tinplate were within the prescribed limit. However, iron solution value of Rourkela tinplate (III) on both sides and Rourkela tinplate (I) on one side was more than the prescribed limit.

INFLUENCE OF GRAIN SIZE STRUCTURE OF TINCOATING ON CORROSION WITH DIFFERENT FRUIT AND VEGETABLE PRODUCTS

Mango slices in syrup: Quality of the product was satisfactory except for slight soft texture of the mango slices in all types of cans upto 12 months storage at room temperature and upto 9 months at 37°C. After 12 months storage at 37°C, metallic taste was noticed in all types of tinplate. The vacuum gradually decreased from the initial value of 12 inches during storage and at the end of 12 months storage at 37°C, mild swelling was observed in the case of cans fabricated from Rourkela E 10 tinplate. Positive pressure was noticed with all other types of cans. Tin content was within the permissible limit of 250 ppm in all types of cans upto 12 months storage at room temperature. However, at 37°C after 12 months storage tin content was beyond the limit in all types of cans and heavy feathering with

TABLE 1. Physical characteristics of different types of tinplate

Sl. No.	Type of tinplate	Grain size structure (ASTM numbers)	Porosity (mg iron/sq. dec.)	ATC* (μ a/sq. cm)	ISV* (seconds)	IS \ * (μ g iron) one side	other side
1	Imported I	7	0.1	0.04	6.6	7.6	8
2	Imported II	8	0.2	—	—	—	—
3	Rourkela I	8	0.13	0.07	4.5	10	46
4	Rourkela II	9	0.3	—	—	—	—
5	Rourkela III	10	0.4	0.11	3.6	75	110
	Limit	9.0	—	0.12	10	20	20

ATC—Alloy tin couple value

PLV—Pickle lag value

ISV—Iron solution value

*Report from M/s Metal Box Co.

heavy detinning was noticed in the can interior (Table 2).

Mango juice: Both at room temperature and 37°C upto 9 months storage, the quality of the product was satisfactory and the tin content was also within the permissible limit in all types of cans (Table 2). After 12 months storage at room temperature the product was acceptable but at 37°C metallic taste was noticed. Vacuum was reduced from the initial value of 13 inches to zero in the case of imported E8, Rourkela E9 and Rourkela E10. Complete detinning was noticed in the can interior of Rourkela E10 tinplate.

Pineapple slices in syrup: At room temperature the quality of the product with respect to appearance, colour and taste was satisfactory upto 12 months in all types of tinplate. However, tin content was slightly more in Rourkela E10 tinplate (Table 2). At 37°C upto 9 months storage the quality of the product was satisfactory, thereafter metallic taste was noticed. Tin content was within the permissible limit in all types of tinplate, but after 12 months storage tin content was more than 400 ppm with heavy feathering and heavy detinning. After 12 months storage at 3°C, hard swell was noticed with Rourkela E10 tinplate and in other types of tinplate the vacuum reduced from 15 inches to 2 inches.

Ivy gourd (Kundri) in brine: Only upto 3 months of storage both at room temperature and at 37°C, the quality of the product was found to be satisfactory (Table 3). Thereafter metallic taste was noticed even at room temperature with more tin content and medium detinning of the can interior. Tin content was beyond the permissible limit after 6 months storage at 37°C in all types of tinplate. Tin content and extent of detinning were more in Rourkela tinplate having small grain size structure as compared to imported and Rourkela tinplate having big grain size structure. These

results indicate that shelf-life of this product is considerably less in all types of tinplate.

Potatoes in brine: Both at room temperature and 37°C the quality of the product was satisfactory even after 12 months storage (Table 3) in all types of tinplate. There was no appreciable difference in purple staining and detinning between the five different types of tinplate. However, tin content was slightly higher in Rourkela tinplate (III) as compared to other types of tinplate.

Grapes in syrup: At room temperature upto 12 months of storage the quality of the product was satisfactory except for the texture (Table 4). At 37°C the colour and taste of the product were slightly affected. Few black spots and scratches were noticed in the can interior in all types of cans without peeling of lacquer. There was no significant difference in iron content between different types of tinplate.

Cabbage in brine: Upto 12 months of storage, both at 37°C and room temperature, quality of the product was satisfactory. There was no appreciable difference in iron content of the product canned in different types of tinplate (Table 4). Can interior was normal and there was no peeling of lacquer.

Conclusion

From the results obtained it may be concluded that Rourkela electrolytic tinplate having grain size structure equivalent or larger than ASTM No. 9 can be used for packing products such as pineapple slices, mango slices, mango juice, potatoes, grapes and cabbage. Rourkela tinplate having grain size structure of ASTM No. 10 may be used for packing mildly corrosive products such as potatoes, cabbage etc. However, both these types of tinplate are not suitable for packing corrosive products like Ivy gourd (Kundri) or high detinners such as

TABLE 2. Tin pick-up and can interior in canned fruits

Name of the product	Storage period (months)	Storage temp. (°C)	Type of tinplate														
			Imported E 7*			Imported E 8*			Rourkela E 8*			Rourkela E 9*			Rourkela E 10*		
			Tin ppm	can interior		Tin ppm	can interior		Tin ppm	can interior		Tin ppm	can interior		Tin ppm	can interior	
Mango slices	Initial	...	25	VLF		28	VLF		28	VLF		30	VLF		35	VLF	
	3	R.T. 37°C	31 93	LF MF	SD	36 115	LF MF	SD	33 90	LF MF	SD	38 85	LF MF	SD	48 109	LF MF	SD
	6	R.T. 37°C	53 120	MF MF	SD	54 130	MF MF	SD	53 123	MF MF	SD	52 106	MF MF	SD	60 144	MF MF	SD
	9	R.T. 37°C	105 186	MF HF	SD	102 182	MF MF	SD	100 183	MF HF	SD	106 186	MF HF	SD	125 225	MF HF	SD
Mango juice	12	R.T. 37°C	127 366	MF HF	SD	135 339	MF HF	SD	138 393	MF HF	SD	130 444	MF HF	SD	165 419	MF HF	MD VHD
	Initial	...	31	VLF		36	VLF		29	VLF		27	VLF		38	VLF	
	3	R.T. 37°C	74 108	LF MF	SD	89 120	LF MF	SD	77 116	LF MF	SD	85 115	LF MF	SD	94 141	LF MF	SD
	6	R.T. 37°C	90 148	LF MF	SD	100 155	LF MF	SD	90 151	LF MF	SD	98 152	LF MF	SD	112 185	LF MF	SD
Pineapple slices	9	R.T. 37°C	100 192	MF HF	SD	100 198	MF HF	SD	105 185	MF HF	SD	105 208	MF HF	SD	125 205	MF HF	SD
	12	R.T. 37°C	124 433	MF HF	SD	143 446	MF HF	SD	119 408	MF HF	SD	132 420	MF HF	SD	165 519	MF CD	SD
	Initial	...	27	VLF		28	VLF		28	VLF		32	VLF		33	VLF	
	3	R.T. 37°C	36 71	LF MF		39 77	LF MF		36 70	LF MF		38 77	LF MF		43 86	LF MF	
Pineapple slices	6	R.T. 37°C	48 98	LF MF	SD	50 99	LF MF	SD	50 93	LF MF	SD	44 95	LF MF	SD	57 100	LF MF	SD
	9	R.T. 37°C	83 151	MF HF	SD	85 157	MF HF	SD	80 155	MF HF	SD	82 152	MF HF	SD	106 220	MF HF	SD
	12	R.T. 37°C	96 418	MF HF	SD	102 402	MF HF	SD	102 416	MF HF	SD	110 414	MF HF	SD	136 508	MF CD	SD

R.T. Room temperature
VLF Very light feathering
LF Light feathering
MF Medium feathering
HF Heavy feathering
SD Slight detinning
MD Medium detinning
HD Heavy detinning
CD Complete detinning

* Grain size number.

TABLE 3. Tin pick-up and can interior in canned vegetables

Name of the product	Storage period (months)	Storage temp.	Type of tinplate							
			Imported E 7		Imported E 8		Rourkela E 8		Rourkela E 9	
			Tin ppm	can interior	Tin ppm	can interior	Tin ppm	can interior	Tin ppm	can interior
Potatoes	Initial 3	... R.T. 37°C	31	LPS	36	LPS	32	LPS	30	LPS
			40	LPS	46	LPS	46	LPS	48	LPS
			61	LPS	65	LPS	63	LPS	61	LPS
	6	R.T. 37°C	48	LPS	45	LPS	51	LPS	53	LPS
			78	SD	69	SD	80	SD	72	SD
	9	R.T. 37°C	82	SD	90	SD	88	SD	85	SD
			112	MPS	118	MPS	112	MPS	98	LPS
	12	R.T. 37°C	112	SD	120	SD	103	SD	113	MPS
			168	MD	172	MD	175	MD	118	MPS
Ivy gourd (Kundri)	Initial 3	... R.T. 37°C	27	LF	25	LF	28	LF	32	LF
			115	MF	115	MF	104	MF	112	MF
			163	HF	175	HF	165	HF	190	HF
	6	R.T. 37°C	200	HF	240	HF	192	HF	195	HF
			304	HD	315	HD	301	HD	298	HD
	9	R.T. 37°C	248	HD	262	HD	250	HD	255	HD
			377	HD	385	HD	369	VHD	360	VHD
	12	R.T. 37°C	350	VHD	371	VHD	362	VHD	360	VHD
			551	CD	550	CD	560	CD	542	CD

TABLE 4. *Iron Pick-up (mg 100g) lacquered cans*

Name of the product	Type of lacquer	Storage period	Storage temp.	Type of tinplate		
				Imported E 7	Rourkela E 9	Rourkela E 10
Grapes	A.R.	Initial	R.T.	0.7	0.8	0.7
		3	R.T. 37°C	1.5 3.5	1.2 2.5	1.6 2.7
		6	R.T. 37°C	1.74 3.6	1.5 3.1	1.8 2.75
		9	R.T. 37°C	2.5 5.0	2.8 4.9	2.3 4.9
		12	R.T. 37°C	3.2 8.9	3.5 6.0	3.7 9.0
Cabbage	S.R.	Initial	...	0.55	0.55	0.6
		3	R.T. 37°C	1.1 1.5	1.0 1.8	1.1 2.1
		6	R.T. 37°C	1.3 2.1	1.1 2.0	1.2 2.2
		9	R.T. 37°C	1.8 3.0	1.5 3.1	1.6 3.5
		12	R.T. 37°C	1.9 3.38	1.7 3.5	2.4 4.0

asparagus, spinach etc., as is also the case with plain imported electrolytic tinplate.

Acknowledgement

The authors wish to express their grateful thanks to Dr B. L. Amla, Director, CFTRI, Mysore, for his keen interest in this work. The authors are thankful to M/s Hindustan Steel Ltd., Rourkela, for supplying tinplates; M/s Metal Box Co. of India Ltd., Calcutta, and M/s Poysha Industrial Co., Bombay, for fabrication of the cans used in these experiments. Thanks are also due to M/s Coorg Fruit and Vegetable Co-operative Processing Society Ltd., Kushalnagar, Coorg, and M/s Kissan Products Ltd., Bangalore, for permitting us to can pineapple and mango products respectively under factory conditions.

REFERENCES

1. Mahadeviah, M. *et al.*, *Indian Food Packer*, 1969, XXIII (2), 25.
2. Girdhari Lal, Siddappa, G.S. and Tandon, G.L., *Preservation of fruits and vegetables*, Indian Council of Agricultural Research, New Delhi, 1967, p. 60 and 71.
3. Hoare, W.E. and Britton, S.C., *Tinplate testing*, Tin Research Institute, England, 1967.
4. Hoare, W.E., Hedges, E.S. and Barry, B.T.K., *The Technology of tinplate*, Edward Arnold (Publishers) Ltd., 1965, p. 375.
5. Kam, G.G., Willey, A.R., Beese, R.E. and Krickl, J.L., *Corrosion*, 1961, 17, 84t.
6. Gowramma, R.V., *et al.*, *J.Fd. Sci. Technol.*, 1970, 7 (1), 37.
7. McKenzie, H.A., *J. sci. industr. Res.* (Australia), 1945, 18, 181.
8. Wong, S.V., *J. biol. Chem.*, 1928, 77, 409.
9. Fruit Products Order, 1955 (As amended upto 31st Dec. 1974), *Indian Food Packer*, 1975, XXIX (1), 46.

STUDIES ON THE OCCURRENCE OF WHITE PATCHES IN CANNED PINEAPPLE—THEIR CAUSES AND CONTROL MEASURES

A. GEORGE VARKEY, A. V. BHAT AND SATYAVATI KRISHNANKUTTY

(Central Food Technological Research Institute Experiment Station, Trichur-1*)

Introduction

Pineapple is one of the important commercial fruits of India. It is mostly grown in Kerala, Assam, Orissa, Mysore, Tripura and West Bengal. Kerala is the second most important state in India in respect of acreage and production of pineapple, but stands first with regard to pineapple processing.¹ The variety *Giant Kew* or *Kew* is considered as the most important commercial variety for processing and is grown over nearly 65 per cent of the cultivable pineapple area in Kerala.

The consumer appeal of canned pineapple is based on the flavour and attractive colour of the pineapple slices. Of recent, there have been frequent reports about the occur-

ence of white patches in canned pineapple slices processed in Kerala. A survey of the literature²⁻¹⁴ reveals little published information on the subject. An investigation was, therefore, undertaken to study the causes for the occurrence of white patches in canned pineapple and measures for control on the commercial *Giant Kew* variety.

Experimental

(i) *Morphology of flower and fruitlet*: At a time, a single flower from the selected pineapple inflorescence was taken and its morphology was studied under a dissection microscope. Similarly, the cross-sections and longitudinal sections of individual fruitlets were also examined (Fig. 1).

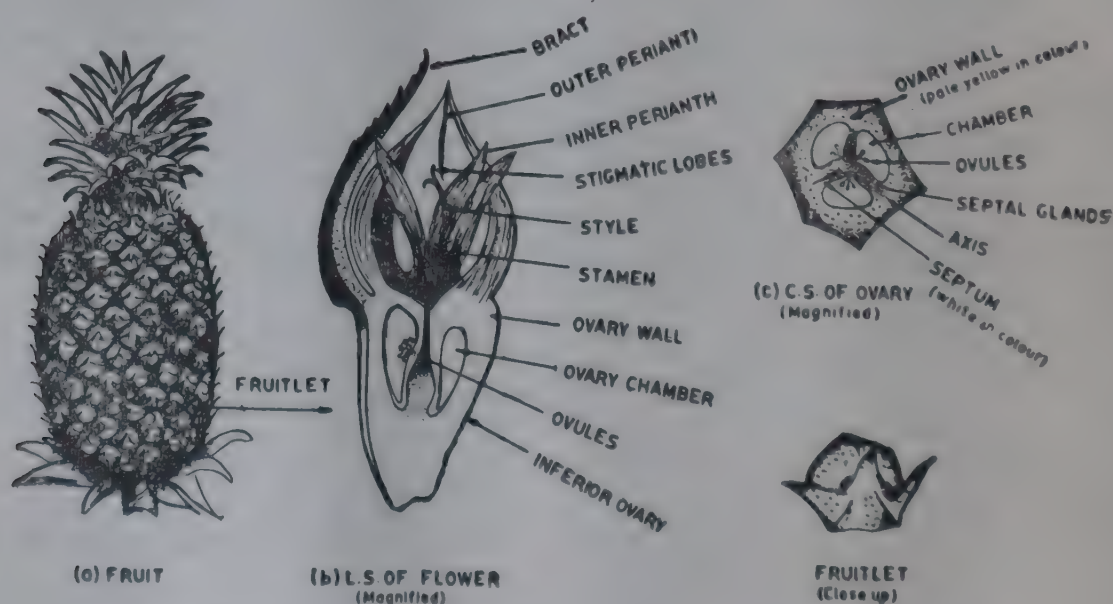


FIG. 1. Morphology of Pineapple Fruit and Flowerd (Variety *Giant Kew*)

* Present Address: CFTRI Unit, C.S.I.R. Complex, Industrial Estate P.O., Trivandrum-695 019, Kerala.

(ii) *Raw materials vs. localities*: The fruits of *Giant Kew* variety from the selected 4 plantations situated in Parvattani, Kannara, Mundur and Ottappalam localities were harvested at the canning maturity stage in order to examine the presence of white patches in the fresh slices.

(iii) *Maturity studies*: About 100 selected pineapple plants were tagged at the time of emergence of inflorescence in a large pineapple plantation at Parvattani, Trichur. Six fruits each were harvested after 80, 90, 105, 115, 120, 125 and 130 days of maturity for observing the presence of white patches before and after canning.

(iv) *Screening of varieties for occurrence of white patches*: The fruits of 16 varieties of pineapples namely, *Smooth Cayenne*, *Giant Kew*, *Charlotte Rothschild*, *Queen*, *Mac-Gregor*, *Repley Queen*, *Alexandra*, *Mauritius*, *Espinola Roja*, *Valera Balanca*, *Singapore Spanish*, *Selengore Green*, *Pulimath Local*, *Kallara Local*, *Thaliparamba Local* and *Conical* grown at the Pineapple and Banana Research Stations at Kannara and Trichur, were harvested at the canning maturity stage and screened for the occurrence of white patches by conducting actual canning trials.

(v) *Canning trials*: Fruits of *Giant Kew* variety after 80, 90, 105, 115, 120, 125 and 130 days of maturity and the fruits of all the 16 varieties of pineapple listed above at the canning ripe stage were used for canning trials. Six fruits of the *Giant Kew* variety were taken at each stage of maturity. The fruits were washed, peeled and sliced into 0.5" thick slices. The slices were punched, cored, eyes were removed, filled into A2½ (401×411) cans, and covered with hot 40° Brix sugar syrup containing 0.3 per cent citric acid. The cans were exhausted to a can centre temperature of 175-180°F, sealed, processed in boiling water for 20 minutes and cooled. The canned product in each case was stored

for 2 months and examined for its quality by a panel of judges, using hedonic scale for sensory evaluation.

(vi) *Methods of analysis*: Total soluble solids were determined by a hand refractometer as acidity (expressed as anhydrous citric acid) was estimated by AOAC method¹⁵.

Results and Discussion

1. *Morphology of pineapple flower and fruitlet*: To know the exact nature or mechanism of formation of white patches in pineapple fruit, a study of the morphology of flower and fruit was considered necessary which is illustrated in Figure 1. In pineapple, the ovary walls and the thick septa become fleshy and juicy and form the sweet edible part. The basal part of the bract, which is fused with ovary wall, also contributes to the formation of the edible part. The ovary of the adjacent flowers are connected by noncarpellary parenchymatous tissue. The fleshy ovary wall and the fused basal part of the bracts were found to be generally yellow in colour depending upon the stage of maturity of the fruit, while, the septa dividing the carpels were found to be whitish in appearance. This peculiar phenomenon seemed to be the inherent characteristic of *Giant Kew* variety since a large number of fruits of this variety, when examined, persistently showed the presence of white patches in slices. The variety *Mauritius* did not show white patches either initially or after canning. However, the fruitlets were similar to that of *Giant Kew* variety except that its edible portion, viz., fleshy ovary wall, fused basal part of the bract and the septa dividing the carpel of the individual fruits were compactly arranged with uniform distribution of colour from pale yellow to yellow depending upon the stage of maturity.

2. *Observation on pineapple fruit grown in different localities*: The pineapple fruits

from different localities around Trichur were procured at the canning maturity stage and examined. The fruits were almost identical in nature and their slices had white patches before canning. There was slight variation in T.S.S. between whitish to yellowish portion of pineapple slices. The mean value °Brix in the white portion was 16.3 while the adjacent yellow portion showed only 14.5, thus, indicating that white portions or patches were slightly sweeter. There was no significant difference in titrable acidity between white and yellow portions. The mean value of titrable acidity was 0.87 per cent in the white portion and 0.86 per cent in the yellow portion.

3. *Seasonal variations:* No material differences were noticed in respect of white patches in pineapples harvested and examined during the main (April to June) and the subsequent (October to November) seasons. Similar observations had been made for the past several years.

4. *Effect of fruit size on occurrence of white patches:* The white patches were present in all the fruits examined irrespective of their size. There was no material difference in the intensity of white patches. The only difference noticed was that white patches were higher in bigger fruits and vice versa.

5. *Appearance of white patches in relation to maturity of the fruit vis-à-vis canning:* The comparative statement on changes in colour and occurrence of white patches in fresh and canned slices of pineapple harvested at different maturity are given in Table 1. The fruits harvested at 80 to 90 days after flowering were found to be immature, the flesh colour was almost dull white to pale yellow and had distinct white patches. The canned slices at this stage of maturity were of light straw yellow colour, hard in texture, raw in taste and lacked the characteristic flavour of pineapple. The white patches were very predominant and clearly visible in those slices. Thus pineapples

at this maturity were unfit for canning. At 105 days of maturity, the slices were of cream yellow colour and had only slight white patches. After processing and storage, the slices were of pale yellow in colour and white patches were fairly visible (Plate 1). The texture, flavour and taste were normal and good. The slices of fruits harvested at 115 to 125 days maturity were yellow in colour with slightly visible white patches. After processing and storage, the slices were golden yellow practically free from white patches. At 130 days of maturity, the slices were golden yellow and had only slight white patches but the product after processing was deep yellow in colour and free from white patches. The slices were, however, slightly soft due to the over ripening. Hence pineapple of *Giant Kew* variety harvested between 115 and 125 days from the time of emergence of inflorescence under Trichur climatic conditions yields an excellent product practically free from white patches. According to an earlier report^{13,14} fruits canned after 120 days of maturity were the best with regard to organoleptic quality, but the report does not mention anything about white patches. The results of this investigation in addition to confirming the results of the earlier study indicate that it also overcomes the appearance of white patches in the canned product.

6. *Screening of 16 varieties of pineapples:* Of the 16 varieties examined, *Queen*, *Espinola Roja*, *Pulimath Local*, *Charlotte Rothschild*, *Mauritius*, *Repley Queen* and *Alexandra* were found to be free from white patches on canning. Hence the phenomenon of occurrence of white patches in pineapple appears to be a varietal or genetical characteristic. This also explains as to why Assam variety (*Queen*) of pineapples, when canned, do not show white patches.

Summary

The phenomenon of occurrence of white patches in pineapple slices has been found

TABLE 1. *Changes in colour, appearance of white patches in fresh and canned slices of pineapple harvested at different stages of maturity*

Sl. No.	Particulars	Stages of maturity : Number of days after flowering						
		80	90	105	115	120	125	130
1.	Flesh colour	(A) <i>Fresh Fruit</i> Pale White	Pale White	Cream Yellow	Light Yellow	Light Yellow	Light Yellow	Golden Yellow
2.	White patches	Conspicuous	Clear	Present	Slightly visible	Slightly visible	Slightly visible	Very slightly visible
1.	Flesh colour	(B) <i>After Canning</i> Pale straw yellow	Pale straw yellow	Pale yellow	Yellow	Yellow	Yellow	Dark yellow
2.	White patches	Clearly visible	Clearly visible	Fairly visible	Not present	Not present	Not present	Not present
3.	<i>Organoleptic Quality:</i>							
(i)	Colour	Pale straw yellow	Pale straw yellow	Pale straw yellow	Yellow	Yellow	Yellow	Dark yellow
(ii)	Texture	Raw and hard	Hard	Normal	Normal	Normal	Normal	Slightly soft
(iii)	Aroma	Fair	Fair	Good	Very good	Very good	Very good	Good
(iv)	Taste	Raw taste	Fair	Good	Very good	Very good	Very good	Good
(v)	White patches	Clearly visible	Clearly visible	Fairly visible	Not present	Not present	Not present	Not present
4.	Suitability for canning	Unfit	Unfit	Fairly good	Very good	Very good	Very good	Fair (Erosion of pieces)

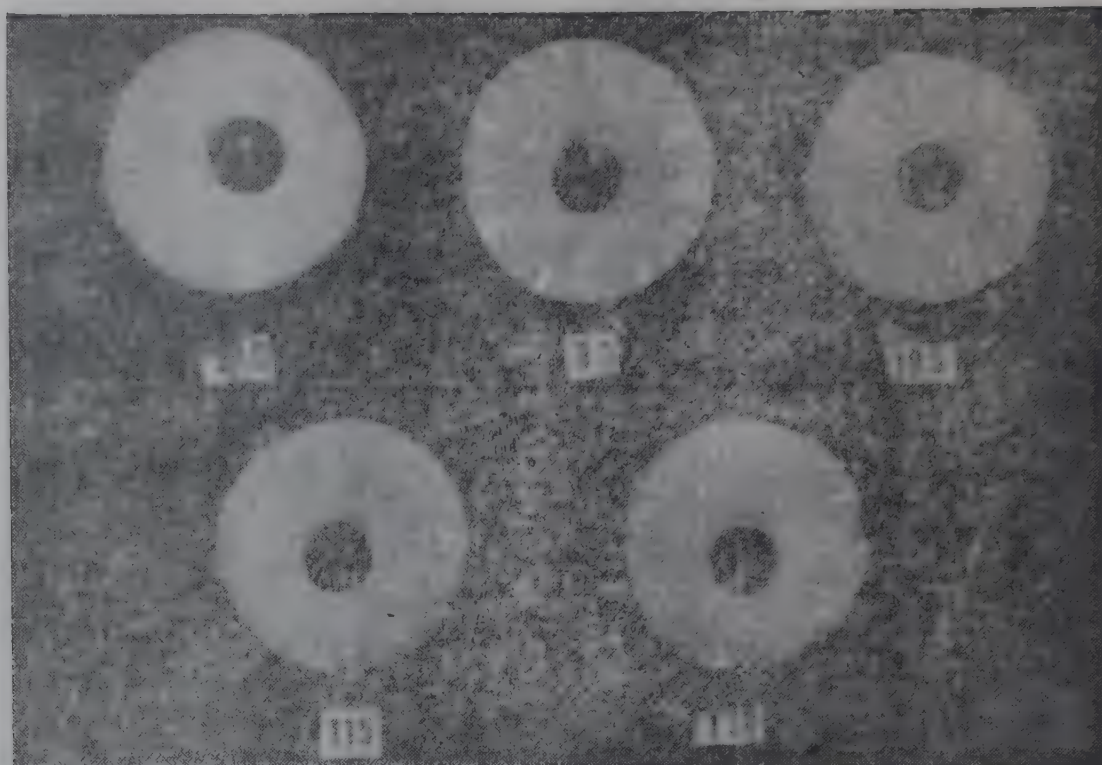


PLATE 1. The comparative visibility of white patches in pineapple slices canned at different stages of maturity

Legend:

80 :	Pineapple slices canned after	80 days after inflorescence emergence
90 :	"	90
105 :	"	105
115 :	"	115
130 :	"	130

to be the inherent characteristic of *Giant Kew* variety un-related to seasonal variations, different soil conditions, etc. The occurrence of white patches in canned slices could be practically overcome by processing the pineapple picked at 115 to 120 days after emergence of flowers under Trichur conditions. Sixteen varieties of pineapple were screened of which only 7 varieties, viz., *Queen*, *Espinola Roja*, *Pulimath Local*, *Charlotte Rothschild*, *Mauritius*, *Repley Queen* and *Alexandra* were found to be free of white patches.

Acknowledgement

The authors are thankful to Mr P. O. Paulose and Dr C. M. Joseph, Botany Department, St Thomas College, Trichur,

for their technical help in morphological studies. The co-operation extended by the staff of the Pineapple and Banana Research Station, Kannara (Kerala Agricultural University), is gratefully acknowledged. The authors wish to express their grateful thanks to Dr B. L. Amla, Director; Mr S. C. Bhattacharjya, Scientist, CFTRI, Mysore and Dr J. S. Pruthi, Project Co-ordinator, Experiment Station, Trichur, for their counsel during this work.

REFERENCES

1. Directorate of Marketing and Inspection, Ministry of Agriculture, Government of India, Nagpur (1971), *Fruit and Vegetable Preservation Industry in India—Statistics of Production and Export during 1969.*

2. Pruthi, J.S., *Bull. CFTRI*, 1954, 4 (2), 41.
3. Pruthi, J.S. and Lal, G., *Bull. CFTRI*, 1954, 4, 284.
4. Pruthi, J.S., Tandon, G.L. and Lal, G., *J. South Indian Hort.*, 1955, 3 (1), 10.
5. Lal, G. and Pruthi, J.S., *Indian J. Hort.*, 1955, 12 (3), 137.
6. Dhopeswarkar, G.A. and Magar, N.G., *Curr. Sci.*, 1950, 288.
7. Dhopeswarkar, G.A. and Magar, N.G., *J. sci. industr. Res.*, 1952, 11A, 266.
8. Dhopeswarkar, G.A. and Magar, N.G., *J. Indian Chem. Soc. (Industr. & News Edn.)*, 1956, 19, 78.
9. Khetry, A.K., Pruthi, J.S. and Lal, G., *Chemical Age (India)*, 1954, 5 (3), 7.
10. Bhatnagar, H.C. and Srivastava, H.C., *Rev Fd. Sci. & Technol.*, 1962, Vol. 4, 179.
11. Pruthi, J.S., Rao, N.S., Susheela, R. and Rao, B.A.S., *First International Congress of Food Sci. & Technol.* (London), 1962, p. 253.
12. Indian Institute of Foreign Trade, *Survey on Indian Export Potential of fresh and processed fruits and vegetables*, 1968, Vol. IB, p. 383.
13. Mookerji, K.K., Bhat, A.V., Satyavati, V.K. and Chitradevi, A. K., *Indian Food Packer*, 1969, 23 (6), 29.
14. Anon., *Ibid.*, 1971, 25 (5), 37.
15. AOAC, *Official Methods of Analysis*, Association of Official Analytical Chemists, Washington, D.C., 1970.

VARIETAL TRIALS IN CANNING OF PINEAPPLES

A. V. BHAT, A. GEORGE VARKEY, SATYAVATI KRISHNANKUTTY AND J. S. PRUTHI
(Central Food Technological Research Institute, C.S.I.R. Complex, Trivandrum-19)

Introduction

Pineapple is one of the most popular fruits grown in India over an estimated area of 10,000 hectares, mostly in the States of Kerala and Assam, and to some extent in West Bengal, Tamil Nadu, Andhra and Karnataka¹. So far, the commercial varieties of pineapple grown and processed in India are *Giant Kew* or *Kew*, *Queen* and *Mauritius*². However, recently the Kerala Agricultural University, Trichur, introduced 16 varieties of pineapple at the Banana and Pineapple Research Station, Kannara. The morphological and physico-chemical characteristics of these varieties and their suitability for canning as slices in syrup of 16 varieties form the subject matter of this paper.

Experimental

(i) *Varietal studies*: The different varieties of pineapple used in the present studies may be classified under the following groups:

I *Cayenne group*: 1. *Smooth Cayenne*, 2. *Giant Kew*, 3. *Charlotte Rothschild*

II *Queen group*: 1. *Queen*, 2. *Mac-Gregor*, 3. *Repley Queen*, 4. *Alexandra*

III *Spanish*: 1. *Mauritius*

IV *African*: 1. *Espinola Roja*, 2. *Valera Balanca*

V *Malaysian*: 1. *Singapore Spanish*, 2. *Selengore green*

VI *Kerala*: 1. *Pulimath Local*, 2. *Kallara Local*, 3. *Thaliparamba Local*, 4. *Conical*

The fruits were harvested at the canning maturity stage for studies on their morphological and physico-chemical characteristics and suitability for canning as slices and juice.

(ii) *Canning trials*: The fruits were washed, decrowned, peeled and sliced into 1/2" thick slices. The slices were then punched, cored, eyes removed; the slices were filled into A2½ (401×411) size cans and covered with hot 40°Brix syrup containing 0.3 per cent citric acid. The cans were exhausted to a can centre temperature of 175-180°F, sealed, processed in boiling water for 20 minutes and cooled. The canned product was examined after 2 months of storage by a panel of judges, using hedonic scale for sensory evaluation.

(iii) *Methods of analysis*: Moisture, sugars (reducing, non-reducing and total), total acidity, crude fibre, ash and ascorbic acid were determined by using standard AOAC methods⁴.

Results and Discussion

Morphology of 16 varieties: The morphological characters of the different varieties of pineapple are given in Table 1.

Between 40 and 90 varieties of pineapple grown in different parts of the world, only a few are of commercial importance, including mainly *Smooth Cayenne*, *Queen*, *Singapore Spanish*, *Red Spanish*, *Pernambuco*, *Ananas Ameritte* and *Vermelto*⁵. Of these, *Smooth Cayenne* is most favoured for canning purposes because of a cylindrical shape, nice, smooth and thin skin, contributing to reduced wastage in processing, and (b) slices being firm after processing. The *Giant Kew* or *Kew* variety grown in Kerala is almost similar in physical and chemical characteristics to the *Smooth Cayenne* except for the occurrence of white

TABLE 1. Morphological characteristics of 16 varieties of pineapple grown at Kannara Pineapple and Banana Research Station, Trichur

Sl. No.	Name of the variety	Physical characteristics/ Habit	Spines	Fruit colour	Shape	Flesh colour	Flavour	Taste	Occurrence of white patches
1.	<i>Alexandra</i>	Upper surface light green, pigment present on the tender leaves and completely pigmented on the older leaves	Present	Yellow, raised	Cylindrical, tapering at the crown end	Golden deep eyes	Pleasant flavour	Very sweet	Not conspicuous
2.	<i>Charlotte Rothschild</i>	Upper surface deep green, lower surface pale green, pinkish at the top of the leaves	Present throughout	Golden fruitlets raised	Small cylindrical	Almost like <i>Queen</i> , uniform yellow, fibrous, deep eyes	Pleasant	Sweet	Uniform yellow No patches
3.	<i>Conical</i>	Leaves deep green in the middle portion, pigmented on the border lines from the base	Present throughout	Orange, flat	Conical	Yellowish deep eyes	Mild flavour	Sweet	Not present
4.	<i>Espinola Roja</i>	Upper surface dark green, lower greenish, slips present, erect habit.	Present	Brownish fruitlets flat	Oblong	Whitish deep eyes	Pleasant	Sweet	Present
5.	<i>Giant Kew</i>	Upper surface light green, lower surface ashy, pigment present in the middle portion of the leaves towards apex	Limited spines present at the tips	Yellow, flat	Some oval, some cylindrical	Cream yellow, shallow eyes	Pleasant	Sweet	Present
6.	<i>Kallara Local</i>	Leaves light green pigmented on the borders, slips present, spreading	Present	Chocolate brown, base yellow, fruitlets flat	Uniform cylindrical	Whitish yellow deep eyes	Mild	Not so sweet	Present
7.	<i>Mac-Gregor</i>	Upper surface light green, lower surface deeply pigmented, aged leaves also pigmented	Present	Yellowish, fruitlets raised	Small cylindrical	Pale yellow, deep eyes	Pleasant	Sweet	Not present
8.	<i>Mauritius</i>	Upper surface light green, pigmented, lower surface ashy	Present throughout	Golden fruitlets raised	Small cylindrical	Almost like <i>Queen</i> , uniform yellow, fibrous deep eyes	Pleasant	Sweet	Not visible
9.	<i>Pulimath Local</i>	Upper surface green, lower surface silvery blue, slips present	Spiny	Yellow	Cylindrical	Yellowish, fibrous deep eyes	Pleasant	Sweet	Not present

8 Table 1 Cond.

Sl. No.	Name of the variety	Physical characteristics/ Habit	Spines	Fruit colour	Shape	Flesh colour	Flavour	Taste	Occurrence of white patches
10.	<i>Queen</i>	Upper surface light green with reddish tinge at the apex, pigmented at tips	Present throughout	Orange yellow, fruitlets raised	Small cylindrical	Pale yellow, deep eyes	Pleasant	Sweet	Not present
11.	<i>Replay Queen</i>	Leaves light green, pigmented	Present throughout	Deep yellow, fruitlets raised	Long shouldered, cylindrical	Golden yellow, deep eyes	Pleasant	Sweet	Not visible
12.	<i>Selengore Green</i>	Upper and lower surface uniform green, slips present, erect habit	Smooth, no spines	Yellow, fruitlets flat	Cylindrical	Pale straw, yellow	Mild	Sweet	Not so conspicuous
13.	<i>Singapore Spanish</i>	Upper and lower surface uniformly green	Not present	Reddish brown, fruitlet flat	Cylindrical	Whitish with predominant yellow streaks, deep eyes	No flavour	Sweet	Yellow streaks in pale yellow flesh
14.	<i>Smooth Cayenne</i>	Upper surface light green, lower surface ashy, pigment present in the middle portion of the leaves towards apex	Limited spines present at the tips	Yellow, fruitlets flat	Some oval, some cylindrical	Cream yellow, shallow eyes	Pleasant	Sweet	Present
15.	<i>Thalipar-amba Local</i>	Leaves green, pigmented on the broader lines, slips present	Present throughout	Orange brown, fruitlets flat	Cylindrical shouldered	Uneven, yellow streaks in white flesh, deep eyes fibrous	Fair	Sweet	Yellow streaks in white flesh
16.	<i>Valera Balanca</i>	Upper surface dark green, lower surface green, slips present, erect habit	Present throughout	Yellowish green, fruitlets flat	Conical	Light yellow, deep eyes	Mild	Sweet	Present

TABLE 2. Chemical composition of fresh fruits of pineapples (Edible portion) (On fresh weight basis)

Sl. No.	Variety	Moisture %	°Brix	Acidity % w/w	Reducing sugars %	Non-reducing sugars %	Total sugars %	Ascorbic acid mg/100g	Crude fibre %	Ash %
1.	<i>Alexandra</i>	80.3	16	0.98	4.17	10.12	14.28	25.6	0.47	0.43
2.	<i>Charlotte Rothschild</i>	79.4	18	0.81	3.94	12.16	16.10	26.1	0.42	0.33
3.	<i>Conical</i>	84.5	12	1.08	2.58	7.79	10.37	24.5	0.48	0.47
4.	<i>Espinola Roja</i>	82.4	14	0.78	5.00	7.97	12.94	24.2	0.62	0.40
5.	<i>Giant Kew</i>	81.8	14	0.83	3.12	9.36	12.48	31.2	0.47	0.31
6.	<i>Kallara Local</i>	86.4	10	0.88	2.74	5.81	8.55	22.5	0.68	0.41
7.	<i>Mac-Gregor</i>	84.2	13	0.94	3.81	7.88	11.69	25.2	0.42	0.41
8.	<i>Mauritius</i>	79.2	18	0.82	4.85	11.29	16.14	24.4	0.72	0.44
9.	<i>Pulimath Local</i>	85.9	11	0.66	2.98	5.84	8.82	25.3	0.60	0.43
10.	<i>Queen</i>	82.8	13	0.82	4.23	7.53	11.76	20.6	0.48	0.38
11.	<i>Repley Queen</i>	80.2	17	0.78	4.43	11.18	15.61	20.6	0.58	0.40
12.	<i>Selengore Green</i>	84.6	12	0.80	2.43	7.95	10.38	26.2	0.46	0.35
13.	<i>Singapore Spanish</i>	83.0	12	0.82	4.01	6.55	10.55	26.8	0.42	0.35
14.	<i>Smooth Cayenne</i>	80.9	16	0.96	4.08	10.38	14.42	24.6	0.45	0.32
15.	<i>Thaliparamba Local</i>	82.1	14	0.83	2.72	9.62	12.34	20.2	0.86	0.42
16.	<i>Valera Balanca</i>	82.1	14	1.17	3.14	9.41	12.55	30.0	0.49	0.34

patches when canned at the improper stage of maturity.

Differences in chemical composition: The results are given in Table 2, a perusal of which reveals the following:

The °Brix varied from 10° to 18° in the varieties studied. The local varieties grown in Kerala like *Kallara Local* and *Pulimath Local* had the lowest sugar content while 2 varieties namely *Charlotte Rothschild* of Cayenne group and the Spanish variety *Mauritius* had the highest sugar content (18 °Brix). *Repley Queen*, *Smooth Cayenne* and *Giant Kew* contained 17, 16 and 14° Brix respectively.

The acidity of the fruits ranged from 0.78 to 1.17 per cent. The African variety

Valera Balanca and the local variety *Conical* had very high acidity (1.17 and 1.08 per cent respectively).

The total ascorbic acid content varied from 21.2 to 30.0 mg/100g. Earlier Pruthi² and Laland Pruthi³ reported that the ascorbic acid content of *Kew*, *Giant Kew* and *Mauritius* varieties varied from 6.1 to 24.6 mg/100g.

The local varieties of pineapple and the *Mauritius* variety were fibrous in nature as is evident from their higher degree of crude fibre content (0.31 to 0.44 per cent)

Varietal suitability for canning: The results of examination of the canned products of 16 varieties are given in Table 3.

TABLE 3. *Canning trials: technological data on 16 varieties of pineapples*

Sl. No.	Variety	Average wt. (kg)	Wt. of crown % (a)	Wt. of peels % (b)	Wastage (a + b) %	Weight of slices %	Weight of pomace %	Size of slices
1.	<i>Alexandra</i>	1.360	9.3	31.9	41.4	29.4	27.9	Small, fit for A1 Tall
2.	<i>Charlotte Rothschild</i>	0.842	16.0	33.2	49.2	25.5	23.7	do
3.	<i>Conical</i>	1.590	...	45.6	45.6	26.4	27.9	do
4.	<i>Espinola Roja</i>	1.505	11.4	36.8	48.25	29.6	22.0	Normal for A 2½
5.	<i>Giant Kew</i>	2.100	14.2	27.1	41.3	35.7	22.8	do
6.	<i>Kallara Local</i>	1.700	10.0	33.5	43.5	29.4	26.3	do
7.	<i>Mac-Gregor</i>	0.730	17.8	32.8	50.6	28.7	20.5	Small for A1 Tall
8.	<i>Mauritius</i>	1.250	16.0	31.2	47.2	22.8	33.0	do
9.	<i>Pulimath Local</i>	1.900	22.3	32.1	54.4	18.9	26.3	do
10.	<i>Queen</i>	0.675	23.7	26.6	50.3	29.6	18.5	do
11.	<i>Repley Queen</i>	1.350	8.8	28.0	36.8	33.3	28.1	do
12.	<i>Selengore Green</i>	1.390	25.1	30.2	55.3	23.0	21.5	do
13.	<i>Singapore Spanish</i>	1.100	17.2	36.3	53.5	26.3	20.0	do
14.	<i>Smooth Cayenne</i>	2.170	15.7	21.2	36.9	36.3	26.9	Normal for A 2½
15.	<i>Thaliparamba Local</i>	1.600	23.1	30.5	53.6	23.7	22.5	Small for A1 Tall
16.	<i>Valera Balanca</i>	1.960	10.2	25.0	35.2	35.5	25.5	Normal for A 2½

Fruits of *Smooth Cayenne* and *Giant Kew* varieties were generally over 2.0 kg in weight. The *Kallara Local*, *Thaliparamba Local* and *Conical* were medium in size (between 1.4 to 1.7 kg) and the other varieties namely *Queen*, *Charlotte Rothschild*, *Mauritius*, *Repley Queen*, *Alexandra* and *Singapore Spanish* were generally smaller in size and less than 1.4 kg in weight.

The yield of pineapple slices varied considerably depending upon variety, their fruit size and shape. The *Smooth Cayenne* and *Giant Kew* varieties gave the highest slice yield of 36.3 per cent and 35.7 per cent respectively, whereas *Pulimath Local* yielded only 18.9 per cent. The wastage (crown and peel) during canning was comparatively

low in the following varieties: *Valera Balanca* (35.2 per cent), *Repley Queen* (36.8 per cent), *Smooth Cayenne* (36.9 per cent) and *Giant Kew* (41.3 per cent). Based on the size and texture of slices (Plate I), *Smooth Cayenne*, *Kew*, *Valera Balanca*, *Espinola Roja*, *Kallara Local* are fit for canning in A2½ cans (401×411) and the other varieties *Queen*, *Mauritius*, *Charlotte Rothschild*, *Repley Queen*, *Selengore Green*, *Alexandra*, *Singapore Spanish*, *Conical*, *Thaliparamba Local*, *Pulimath Local* in A1 Tall cans (301×411). The variety *Mac-Gregor* was found to be unfit for canning due to small size, deeper eyes, brownish colour and poorer quality after processing.

Results of cut-out examination: The

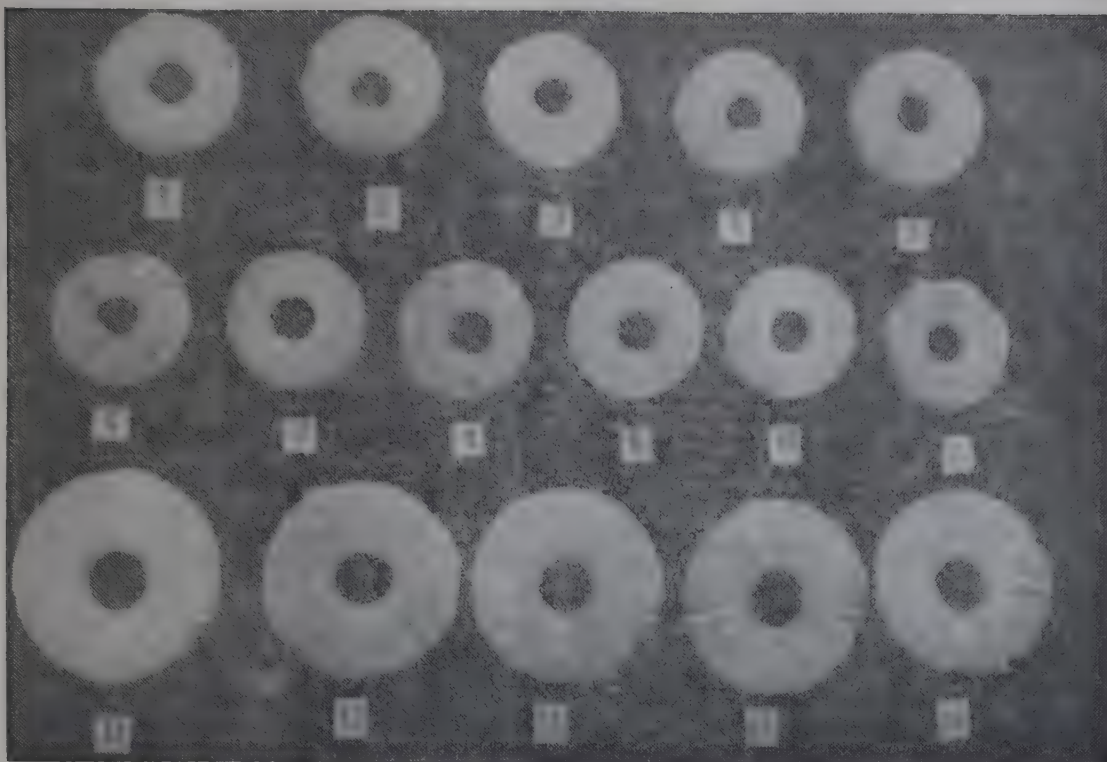


PLATE I: Comparative difference in canned slices of 16 varieties of pineapple.

Legend: 1. *Pulimath Local*; 2. *Thaliparamba Local*; 3. *Selengore Green*; 4. *Singapore Spanish*; 5. *Conical*; 6. *Queen*; 7. *Charlotte Rothschild*; 8. *Mauritius*; 9. *Repley Queen*; 10. *Alexandra*; 11. *Mac-Gregor*; 12. *Smooth Cayenne*; 13. *Giant Kew*; 14. *Espinola Roja*; 15. *Kallara Local*; 16. *Valera Balanca*.

results of cut-out examination after a storage period of two months at room temperature (27°C to 30°C) are summarised in Table 4 and the appearance of canned pineapple slices are shown in Plate I.

Smooth Cayenne and *Giant Kew* were found to be superior in colour, texture, taste, aroma, and overall acceptability, as compared to all other varieties examined. The varieties *Queen*, *Mauritius*, *Charlotte Rothschild* and *Alexandra* were free from white patches and the product was yellow to deep yellow in colour. The texture was normal, the flavour and overall acceptability were good, but suitable for canning as slices in A1 Tall cans. However, they can be used for canning as chunks. The varieties *Espinola Roja*, *Kallara Local*, *Thaliparamba Local*, *Repley Queen* and *Conical* are good for processing followed by *Pulimath Local*,

Singapore Spanish, *Selengore Green* and *Valera Balanca*. The variety *Mac-Gregor* was poorer in quality since the canned slices were surprisingly brown in colour, soft in texture, poor in taste and aroma and hence unfit for canning.

Summary

Sixteen varieties of pineapple harvested at canning maturity stage were examined with respect to morphological and chemical characteristics and suitability for canning. The varieties *Smooth Cayenne* and *Giant Kew*, which yield higher percentage of slices for processing, were found to be superior in colour, texture, taste, aroma and overall acceptability as compared to all other varieties screened. *Giant Kew* or *Kew* was almost similar in morphological, chemical and canning quality to that of *Smooth Cay-*

TABLE 4. Cut-out examination of canned pineapple slices of 16 varieties

Sl. No.	Variety	Vacuum in in.	Drained wt. %	°Brix of syrup	Acidity of syrup %	Can size	Product			White patches	Overall acceptability
							Colour	Texture	Aroma	Taste	
1. <i>Alexandra</i>		11	51.0	27	0.64	A1 Tall	Yellow	Normal	Good	Good	Good
2. <i>Charlotte Rothschild</i>		12	56.0	24	0.54	A1 Tall	Dark Yellow	Normal	Good	Sweet	Good
3. <i>Conical</i>		12	52.0	25	0.64	A1 Tall	Deep Yellow	Normal	Good	Good	Good
4. <i>Espinola Roja</i>		10	53.4	25	0.70	A 2½	Pale Straw Yellow	Normal	Fair	Good	Good
5. <i>Giant Kew</i>		12	54.0	20	0.58	A 2½	Bright Yellow	Normal	Good	Good	V. Good
6. <i>Kallara Local</i>		11	54.6	20	0.70	A 2½	Yellow	Normal	Good	Good	Good
7. <i>Mac-Gregor</i>		13	55.0	20	0.58	A1 Tall	Brownish	Soft	Poor	Poor	Unfit for canning
8. <i>Mauritius</i>		12	58.0	24	0.56	A1 Tall	Dark Yellow	Normal	Good	V. Sweet	Good
9. <i>Pulimath Local</i>		10	52.3	19	0.58	A1 Tall	Deep Yellow	Slightly hard	Good	Fair	Fair
10. <i>Queen</i>		12	56.0	26	0.51	A1 Tall	Dull Yellow	Normal	Good	Sweet	Good
11. <i>Repley Queen</i>		12	59.0	20	0.62	A1 Tall	Pale Straw Yellow	Slightly hard	Fair	Raw	Good
12. <i>Selengore Green</i>		10	52.0	28	0.54	A1 Tall	Pale Straw Yellow	Normal	Fair	Sweet	Fair
13. <i>Singapore Spangish</i>		10	58.0	27	0.54	A1 Tall	Dull Yellow	Normal	Fair	Fair	Fair
14. <i>Smooth Cayenne</i>		12	56.0	20	0.54	A 2½	Bright Yellow	Normal	Good	Good	V. Good
15. <i>Thaliparamba Local</i>		12	57.0	28	0.58	A1 Tall	Yellow	Normal	Good	Sweet	Good
16. <i>Valera Balanca</i>		11	51.2	22	0.68	A2½	Slightly Yellow	Normal	Normal	Fair	Fair

enne. The canned slices from the varieties of *Queen*, *Mauritius*, *Charlotte Rothschild*, *Alexandra* were yellow to dark yellow in colour; the texture was normal; the flavour and overall acceptability were good. The slices were fit for canning in A1 Tall cans (301 × 411) and more suitable as table varieties. *Espinola Roja*, *Kallara Local*, *Thaliparamba Local*, *Repley Queen* and *Conical* were good for processing followed by *Pulimath Local*, *Singapore Spanish*, *Selengore Green* and *Valera Balanca*. The variety *Mac-Gregor* was unfit for canning due to small size, deeper eyes, poor colour and poorer quality after processing.

With regard to varietal suitability for canning as slices, *Smooth Cayenne*, *Giant Kew*, *Valera Balanca*, *Espinola Roja*, *Kallara Local* are fit for canning in A2½ cans (401 × 411) and the other varieties in A1 Tall cans (301 × 411). However, they can be used for canning as chunks in the usual can sizes. Physico-chemical composition of 16 varieties of pineapple are presented.

Acknowledgement

The co-operation extended by the staff of the Pineapple and Banana Research Station, Kannara (Kerala Agricultural University), is gratefully acknowledged. The authors are also grateful to Dr B. L. Amla, Director and Shri C. P. Natarajan, Chairman, Experiment Stations, for their keen interest in the work.

REFERENCES

1. Bhatnagar, H.C. and Srivastava, H.C., *Rev. Fd Sci. and Technol.*, Association of Food Scientists and Technologists (India), 1962, 4, p. 179.
2. Pruthi, J. S., *Bull. CFTRI*, 1954, 4 (2), 41.
3. Lal, G. and Pruthi, J. S., *Indian J. Hort.*, 1955, 12 (3), 137.
4. AOAC, *Official Methods of Analysis*, Assn. of Official Analytical Chemists, Washington, D.C. 1970.
5. Indian Institute of Foreign Trade, *Survey of Indian Export Potential of fresh and processed fruits and vegetables*, 1968, Vol. I B, p. 383.



CARAMEL COLOUR

M. L. SHANKARANARAYANA, K. O. ABRAHAM, B. RAGHAVAN AND C. P. NATARAJAN
(Central Food Technological Research Institute, Mysore-570 013)

Introduction

Colour is an important quality characteristic of foods. It is perceived by the human senses and is indispensable to the modern day consumer as a means for the rapid identification and ultimate acceptance of the foods. Therefore, the colours form an important group of food additives. The major use of the food colours is perhaps by the beverage industry. Each of the beverages is characterised by its own specific colour, for example, lemon/lime: yellow; orange based drinks: orange; cola type beverages: amber brown, etc. Colour additives may be broadly classified into two types, viz., natural and synthetic. Annatto extracts, curcumin, beet red, chlorophyll, carotenoids, capxanthin, etc. are the natural colouring matters whereas coal tar dyes form the major synthetic colours.

Caramel is an important colour widely used in a variety of foods like carbonated and non-carbonated beverages, bakery and confectionery, meat products, vinegars and in pharmaceutical preparations. The use of caramel evolved in such a gradual manner that it was considered to be a natural part of many foods. It might be argued that caramel can be considered as a natural constituent of the diet as it can be formed when certain carbohydrate-rich foods are prepared by baking, frying or roasting. However, caramel is classed as an artificial colour by the U.S. Food and Drug Administration since it is a colouring matter artificially made from natural products. Caramel is a dark brown to black liquid or solid possessing the odour of burnt sugar and a

pleasant bitter taste. It is prepared by the controlled heat treatment of food grade carbohydrates (sucrose, glucose, invert sugar, starch hydrolysates, malt syrup, molasses, etc.) with or without the addition of acids (sulphuric, phosphoric, citric, acetic, etc.), alkali and salts (hydroxides and carbonates of ammonium, sodium, potassium and calcium).

Types of caramel: There are various types of tailor-made caramels^{1,2} possessing the characteristic physical and chemical properties. The specific end use of the caramel governs the selection of the raw materials and also the processing conditions. The caramels may be essentially classified into two major groups, viz., (1) Acid proof and (2) Bakers and Confectioners. The bulk of the caramel colouring manufactured today goes into soft drinks like colas, root beer, ginger ale, cream soda, etc. It is mandatory that the caramel colouring used in carbonated beverages be acid proof to be compatible with the low pH prevalent in the finished drinks. The second largest use of caramel is in baking and confectionery industry. It is extensively used in rye bread, cookies, cakes, biscuits, toffees, chocolates, candies, etc.

Preparation of caramel: The housewife has always prepared her own caramel by heating sucrose in a pan over an open flame. The sugar melts, water of crystallisation is lost and the resulting hard material is used more as a flavouring ingredient rather than colour. However, commercial caramel colour is an entirely different material with high tinctorial value and negligible flavour

effects. The most common raw material used in such a caramel preparation is a liquid corn sugar or hydrolysates of certain starchy foods rich in dextrose equivalent (~ 75 per cent). The quality of the caramel is dependent to a large extent on the purity of the raw material. In recent years, a large amount of first greens (the residual syrup after the first centrifugation of crystalline dextrose) is being used in view of its low cost. However, the resulting product will have a high ash content.

In the manufacture of caramel, the equipment and machinery such as production cookers, filters, pipelines, pumps, storage tanks, etc. are made of special quality stainless steel to guarantee the purity of the final product. The caramel colour is produced in two types of kettles—open and closed.

Open kettle process: This is the earliest type. It uses a variety of heating methods like coke fire, gas fire, high pressure steam, etc. The kettles are made of stainless steel, 6 to 8 ft. in diameter and usually jacketed with provision for stirring arrangement. A thermocouple is employed for reading the temperature of the reaction mixture. The kettle is loaded with the sugar syrup and heated ($130\text{--}135^\circ\text{C}$) for 5-7 hours, with stirring along with the other reactants like sulphuric acid, ammonium bisulfite, etc., till the required colour strength is obtained. Cold water is added to the reaction mixture to arrest the caramelisation and the temperature is brought down to about 90°C . The solution is filtered, cooled and stored. The colour strength, viscosity and shelf-life of the caramel are very much dependent on each stage of the above reactions. Therefore, strict control of the reaction conditions is essential to obtain a uniform quality product.

A typical example of the caramel production by the open kettle process³ (1750 L capacity) is as follows. Corn syrup (1630 L of 30.8 Baumé) is taken in a steam jacketed

tank to which dilute sulphuric acid (8.2L, 50 per cent) is slowly added with stirring. The syrup mixture is heated to boiling and ammonium hydroxide (30L, 28 per cent) is added followed by the addition of ammonium sulphate (1.5 kg). The mixture is further boiled for a period of 45 min. Sodium bisulphite ($400\text{g} \times 175$) and ammonium sulphate (7 kg) are added. After thorough mixing, ammonium hydroxide (17L) is added and the reaction mixture heated to 120°C . After a lapse of about 4 hr a further quantity of ammonium hydroxide (16L) is added, the heating discontinued and the mixture allowed to stand for 1 hr. The mixture is again heated to about 128°C (within 2 hr) and the sample analysed for the colour strength. The caramel is filtered, cooled and stored in stainless steel tanks or in plastic lined steel drums. Caramelisation yields large molecular size polymers and the reactions continue even during storage though at slow rate. At higher temperatures, the caramel colour resinifies into an amorphous irreversible gel. However, a good quality caramel can be stored a year or longer at room temperature without any deterioration. A relationship seems to exist between viscosity and the rate of solubility of caramel. Usually, less viscous caramels dissolve faster and have greater colour stability, shelf-life and further, they can be handled with a minimum of waste and effort.

*Closed kettle process*⁴: This consists of a steam jacketed kettle 6 ft. in diameter and about 16 ft. tall, equipped with agitators, thermometer, pressure gauge, vent pipe, etc. The kettle has an outlet at the bottom and other pipes for the addition of water, ammonia and compressed air. In the production of beverage caramel, the kettle is first loaded with 1600-1700 gal. of 45°Bé sugar syrup to which dilute sulphuric acid is slowly added till the attainment of pH 1.2 to 1.5. The mixture is heated to a temperature of about 120°C for 3 hr.

Ammonia is then added and the heating continued followed by the addition of an ammonium salt and sodium bisulphite. The mixture is further heated to about 135°C till the desired colour strength is obtained. Further processing steps are essentially the same as already described in the open kettle process.

There are different grades and forms of caramel meant for specific use in foods. Acid proof caramels are made either single or double strength depending on the preference of the individual bottler. The starting material for both the types is corn syrup with a dextrose content of about 75 per cent which after caramelisation drops to the vicinity of 25 per cent in the case of single strength and 10 per cent in the case of double strength. As the name implies, the colour value of the latter is about twice that of the former. Since the double strength caramel contains a minimum of unreacted sugars and only half the quantity is required, it contributes substantially fewer calories to the finished drink. Hence, it finds a special use in dietetic drinks. The other varieties of caramel are foaming type, spirit caramel, malt caramel, caramel powder, etc. Foaming type caramel, which is responsible for the thick rich foam, characteristic of root beers is prepared by a special processing technique. This caramel is, however, less stable in acid solutions. Spirit caramel is mainly prepared from cane sugar. This has a very low colour value and finds use in whiskey, brandy, cordials, etc. The essential requirement of this caramel is that it should dissolve in a 60 per cent solution of alcohol in water. However, this caramel when dissolved in water will flocculate or precipitate with a trace of acid. Malt caramel is used in brewing to impart colour and flavour to beer. It is prepared from malt syrup or combination of malt syrup and corn syrup. The dried caramel powders are particularly used in cake mixes and dry products where the use of liquid

caramel is impracticable. These are prepared by spray drying or drum drying the liquid caramel with or without the starch dextrin as the base. The powdered caramel is a very stable product but is hygroscopic and the containers must be resealed after use.

Chemistry of caramelisation: Very little information is available on the chemistry of caramel colour. The caramel is produced by three major types of reactions⁶:

(i) *Maillard reaction:* Aldehydes, ketones and reducing sugars react with amines, amino acids, peptides and proteins to produce brown polymers.

(ii) *True caramelisation:* The polyhydroxycarbonyl compounds such as sugars when heated to high temperatures polymerise yielding dark coloured products.

(iii) *Oxidation reactions:* The compounds formed in the above reactions may interact among themselves or with oxygen producing larger molecules.

In the manufacture of caramel, the dextrose under conditions of acid and heat polymerises resulting in the release of water. The ammonia added reacts with the aldehyde group to form the aldehyde ammonia, followed by rearrangement, condensation and polymerisation reactions yielding the caramel colour. The mechanism of browning in sugar-amine systems in general follows seven steps, in three stages:

- A. Initial colourless stage
 - (1) Sugar-amine condensation.
 - (2) Amadori rearrangement.
- B. Intermediate colourless or yellow stage
 - (3) Sugar dehydration.
 - (4) Sugar fragmentation.
 - (5) Amino acid degradation.
- C. Final highly coloured stage due to melanoidin formation.

- (6) Aldol condensation.
- (7) Aldehyde-amine polymerisation, formation of heterocyclic nitrogen compounds.

In addition to the above reactions, the variables such as pH, temperature, time, nature and concentration of the reactants, etc. make the chemistry of caramel formation an exceedingly complex one.

Physical and chemical properties: Caramel is a dark brown colouring material which is freely soluble in water and insoluble in most of the organic solvents. The concentrated caramel has a distinctive burnt taste but when diluted to the levels of usage, it is without taste. A water solution of caramel is sparkingly clear and brilliant. The specific gravity of liquid caramels ranges from 1.25 to 1.38. The viscosity of these can vary from as low as 50 cps at 25°C to as high as 500 cps. However, most of the beverage caramels show a value around 250 cps. Although a relationship exists between the viscosity and the rate of solubility, there seems to be no relationship between the viscosity and the colour value. The viscosity of a liquid caramel is greater than the viscosity of the starting syrup. This thickening of the product is a normal feature of any caramelisation and the extent of thickening is dependent on the processing conditions. In view of the wide variation in the viscosity observed among the commercial samples, this property assumes an importance in determining the storage behaviour of caramels. If a workable viscosity at the usual specific gravities is not achieved by the normal manufacturing process, the same is achieved by appropriate dilution with water. However, care should be taken to keep the solids content high enough to prevent fermentation. The amount of total solids in general varies between 50 to 70 per cent. The dry matter content of caramel colour cannot be determined by the usual oven procedure since

heating causes further colour reactions resulting in the release of more water of crystallisation. Therefore, the azeotropic distillation using benzene is preferred for the determination of moisture.

The common characteristic of all caramels is their colloidal nature. The colloids carry an electrical charge, the nature of which (positive or negative) depends on the method of manufacture. The particles are held in solution partially by small electrical charges. Caramel in aqueous solutions such as in soft drinks must be chemically tailored to be compatible with the other ingredients. The parameter which determines this is the isoelectric point which is defined as the pH at which the ionic charge of the colouring bodies is electrically neutral. At a pH above the isoelectric point, caramel is negatively charged in solution while at a pH below this point, it is positively charged. Flavouring extracts used in soft drinks contain negatively charged colloidal particles especially in acid medium. In addition, refined sugar and purified water may contain small quantities of negatively charged colloidal materials. If caramel molecules with positive charges are introduced into the beverage, mutual attraction between oppositely charged molecules takes place resulting in turbidity/flocculation. Therefore, for soft drinks, a caramel whose isoelectric point is lower than the pH of the beverage should be used, thus ensuring that it carries a negative charge. Such caramels are referred to as 'acid proof'. Thus, a good beverage caramel should have isoelectric point below pH 2.0 to provide an adequate margin of safety. However, in the case of spirit caramel, for use in whiskey, brandy, cordials, etc., the isoelectric point below a pH 1.5 is preferred to avoid coprecipitation with tannin-like materials. Bakers' caramel has isoelectric point around 4.0 or higher. Another important property which determines the quality is the pH which varies with the type of caramel.

The pH varies between 2.7 to 3.3 for acid proof beverage colour, 3.2 to 3.6 for foaming type and 4.0 to 4.5 for bakers' and brewers' colour.

The various tests⁶ for determining the colloidal character, isoelectric point and acid proofness are described below.

Colloid character: Prepare 1 per cent solutions of tannic acid and caramel using distilled water. Filter tannic acid solution, if necessary. Mix 13 ml of caramel and 12 ml of tannic acid solutions. The mixture should remain clear for 24 hours.

Isoelectric point: Dissolve 2.5 g gelatin in 500 ml distilled water. Transfer 100 ml aliquots into 4 beakers and adjust the pH to 1.0, 1.5, 2.0 and 2.5 respectively, using hydrochloric acid. Similarly, place 100 ml quantities of 0.1 per cent aqueous solution of caramel in 4 different beakers and adjust the pH in each to 1.0, 1.5, 2.0 and 2.5 as above. Add few drops (5 to 10) of the gelatin solution to the corresponding (pH) caramel solutions taken in four test tubes and observe for any haziness at the interface. Allow the test tubes to stand for 12 hr. and repeat the observations. The isoelectric point of gelatin is 4.7, below which it is a positive colloid and will be precipitated by a negative caramel. If the caramel is positively charged, it forms a clear solution with the gelatin. A haze at a particular pH shows that the isoelectric point of the caramel is below this value.

Acid resistance: Prepare 1 per cent caramel solution with distilled water. Dilute 50 ml of this to 250 ml and reflux for 30 min with 7 ml conc. hydrochloric acid. Cool to room temperature and observe for cloudiness. If the solution remains clear for 48 hr, the caramel is acid proof. The pH of the caramel is determined using glass electrode.

Colour intensity: All caramels are purchased for their colour value referred to as tinctorial power. The caramel colour

spectrum is made up of about 70 per cent red, 25 per cent yellow, and 5 per cent blue. A 1 per cent solution of beverage caramel appears to be red by transmitted light and this on further dilution gives an amber colour, characteristic of cola beverages. Therefore, any measurement of colour should preferably be carried out at this level of dilution. The colour measurement can be made either visually or using a spectrophotometer. The most common visual method⁷ employs a Lovibond tintometer using Lovibond amber series No. 52 and the red series No. 200. In this, a 0.1 per cent solution of caramel is compared visually with the standard colour slide. The colour intensity is expressed in arbitrary units (European Brewery Convention). The single and double strength caramels possess tinctorial powers in the range 20,000 to 25,000 and 45,000 to 50,000 EBC units respectively. The data such as EBC, solids content and the specific uses of liquid caramels⁸ (sucrose) are given in Table 1. Horne colour scale is a modified Lovibond system wherein the standard amber coloured glass (No. 10) consists of a Lovibond red glass (No. 6.2) sandwiched between two yellow glasses (Nos. 10 and 30). The Lovibond procedure is simple but it does not give consistent and accurate results. Linner⁹ has recently standardised a spectrophotometric procedure for determination of both hue and tinctorial power. The caramel solutions obey Beer's law upto a concentration of about 0.2 per cent. The hue of a caramel colour is referred to as hue index (S) which is determined by measuring the absorbances of a 0.1 per cent solution at 510 and 610 nm.

$$\text{Hue index} = 10 \log \frac{(\text{absorbance at 510 nm})}{(\text{absorbance at 610 nm})}$$

The hue index is a measure of the redness of a caramel and it ranges from 3.4 (very dark brown) to 6.1 (reddish brown). Caramel colours having identical hue indices can be diluted to give solutions possessing

TABLE 1. *General characteristics and uses of liquid caramels* (Sucrose)*

Colour value EBC	Solids content per cent w/w/	Characteristics and uses
56,000	65.5	Very high tinctorial value, used where no critical stability required, e.g., liquorice doughs or pastes.
48,000	71.6	High tinctorial value, stable in salt solution or acid solution, used in glazes, fruit pastes and toffees.
32,500	76.2	Soft flavoured caramel for fillings and caramel products.
23,000	77.3	Resistant to vegetable extracts, also acids, stable in ethyl and isopropyl alcohol upto 70 per cent. For flavouring essences.
17,000	69.6	Stable to alcohol upto 80 per cent; specially for whiskey, rum and spirit liquors.

identical absorption spectra. The tinctorial power (K) is calculated using the absorbance value at 560 nm. The tinctorial power (K) is the absorbance value at 560 nm of a 0.1 per cent solution of caramel (W/V) using 1 cm cell.

The tinctorial values for single and double strength caramels are about 0.2 and 0.4 respectively.

Iron content: This originates from the starting sugar material, or from the vessel employed for manufacturing and storage of the caramel. A higher content of iron imparts an unpleasant metallic taste. The iron content in the commercial samples of caramel ranges from 10 to 25 mg/kg.

Ash content: As already pointed out, the ash content of a caramel colour depends largely on the purity of the starting carbohydrate material. Further, it is influenced by the nature and the purity of the salts employed as catalysts during the manufacture of caramel. The various specifications of caramel colour, according to Food Chemicals Codex¹⁰ and WHO Food Additives¹¹, are described below:

Sulphur dioxide: Not more than 0.1 per cent, as determined by the standard method^{12a}.

Phosphate: Not more than 0.5 per cent, as determined by the AOAC method^{12b}.

Arsenic: Not more than 3 mg/kg. This is colorimetrically^{10a} determined.

Lead: Not more than 5 mg/kg. This is determined colorimetrically using dithizone reagent^{10b}.

Copper: Not more than 20 mg/kg, determined by atomic absorption spectrophotometry.^{12c}

Mercury: Not more than 0.1 mg/kg, determined by atomic absorption spectrophotometry^{12d}.

Heavy metals (as Lead): Not more than 25 mg/kg, as determined by converting them into sulphides^{10b}.

Ammoniacal nitrogen: Not more than 0.5 per cent, as determined by the standard method^{12e}. The excess addition of ammonium salts during the manufacture of caramel can enhance the tinctorial power. Such a product, however, will have a tendency to resinify quickly on storage. In view of this and also the limits specified above, one has to strike a compromise between the tinctorial

TABLE 2. *Analytical data of some commercial acid proof caramel colours*

Properties/Specifications	Sample 1	Sample 2	Sample 3	Sample 4	Sample 5
1. Tinctorial power (0.1% Soln.)					
Absorbance at 560 nm	0.190	0.400	0.162	—	0.680
EBC units	—	—	—	23,500	—
2. Hue index	4.63	4.13	4.47	—	3.90
3. pH	2.9	2.9	2.9	3.0†	3.6‡
4. Dry matter%	63.5	51.3	66.4	—	97.0
5. Baumè (15.6°C)	35.0	29.0	35.5	—	—
6. Specific gravity (15.6°C)	1.3182	1.2500	1.3242	1.2684*	—
7. Viscosity, cps at 26.7°C	275	200	250	—	—
8. Acid haze point, minutes	140	450	160	60	600
9. Acid gel point, minutes	240	700	260	100	7000
10. Acid tannin, acid boil (30 min)	passes test	passes test	passes test	passes test	passes test
11. Isoelectric point below pH	—	—	—	2.0	—
12. Ash%	2.2	0.3	2.0	4.2	2.0
13. Iron, ppm	10	8	8	25.0	—
14. Copper, ppm	2	2	2	20.0	—
15. Arsenic, ppm	—	—	—	2.0	—
16. Lead, ppm	—	—	—	4.0	—

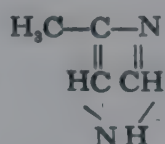
* 20°C

† 10 per cent W/V soln.

‡ 1 per cent soln.

power and the quantity of ammonia needed. The characteristic properties of some of the commercial caramels are given in Table 2.

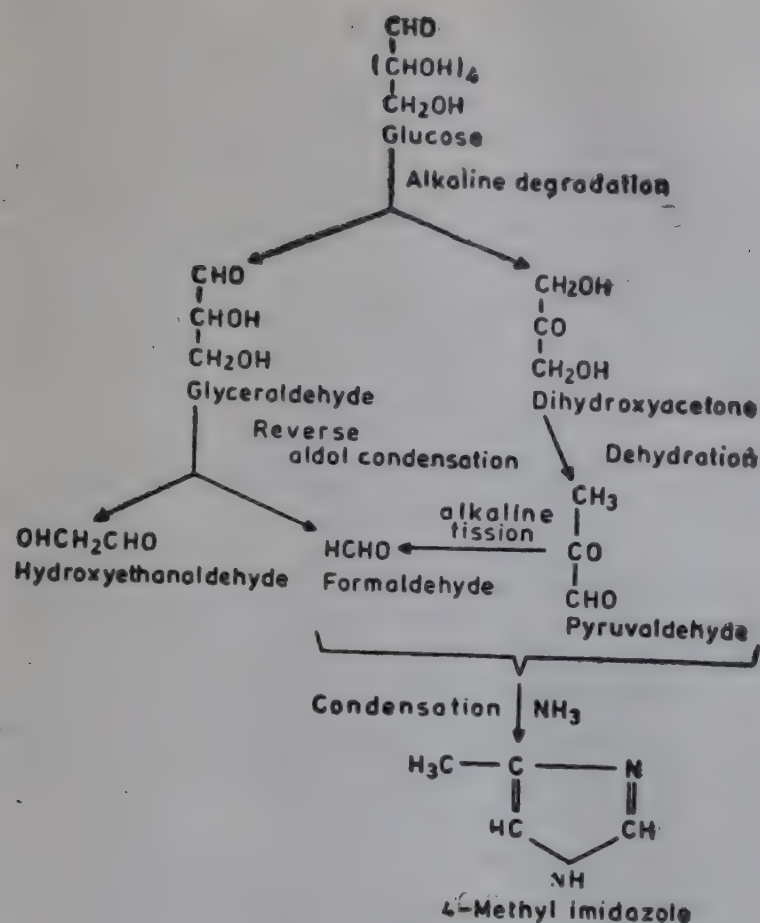
4-Methyl imidazole: toxicological (?)
and analytical aspects



This occurs invariably in the caramels prepared by the ammonia process. The range of concentrations of it varies widely depending on the manufacturing process and the raw materials employed. In the course of caramelisation process at high temperatures, 4-methyl imidazole is formed due to reactions among glucose degradation

products and ammonia. It has been shown that the yield of imidazole compounds increases linearly with the increase of molar ratio of ammonia to glucose. The probable mechanism of reactions¹³ is on page 33.

Cattle and sheep fed on ammoniated molasses developed hystéria and convulsions¹⁴. The molasses were found to contain 4-methyl imidazole as well as other imidazoles and pyrazine derivatives. The studies of Nishie *et al.*¹⁵ indicated 4-methyl imidazole to be the most likely toxic component. Commercial food grade caramels¹⁴ are reported to contain 20 to 200 mg of 4-methyl imidazole per kg of caramel while caramels of undefined origin 50 to



700 mg/kg. A survey of the toxicological studies shows that the intake of caramel colours prepared by ammonia process has no deleterious effects as revealed by the short term studies. Further, a single dose of caramel upto 10 g/kg body weight in mice and 15 g/kg in rabbits showed no ill effects on these animals¹⁴. At high levels of intake of caramel colours there is no evidence of any convulsions or other adverse neurological or of histopathological damage¹⁴. In a recent two-year feeding study¹⁶, the rats fed on caramels (upto 10 per cent of the diet) containing as much as 600 mg/kg of 4-methyl imidazole showed no ill effects. Therefore, the consumption of caramel containing trace amounts of 4-methyl imidazole does not appear to pose a serious health problem. However, long term systematic studies are required for definite conclusions.

In the meanwhile, as a precautionary measure¹⁴, the FAO/WHO have specified the limit of 4-methyl imidazole at 200 mg per kg of caramel. The suggested maximum acceptable daily intake of caramel for man is 100 mg/kg body weight. For the determination of caramel content in processed foods, one can use the spectrophotometric method. However, for an accurate assay, a knowledge of the reference caramel employed in the product is essential in view of the wide variation in the colour strengths of commercial caramels.

The determination of 4-methyl imidazole in caramel colours is carried out using thin layer or gas chromatography. The first step is the isolation of the imidazole. Caramel taken on a basic celite column is eluted with a mixture of chloroform and ethanol. The eluant is extracted with dilute sulphuric

acid, concentrated and neutralised to a pH around 9.

(a) The TLC of the above is carried out on silica gel plates using a solvent system: diethyl ether, chloroform, methanol and ammonium hydroxide (80:20:20:4 by volume). The developed spots are visualised by spraying with diazotised sulfanilic acid and the intensity compared with those of known standards¹⁷. The TLC procedure is useful for a rough estimation of 4-methyl imidazole.

(b) For accurate determinations, the gas chromatography can be used. The conditions employed by Wilks *et al.*¹⁷ are as follows: Column: a combination of carbowax (5 per cent) and potassium hydroxide (2 per cent) on anakrom AB (80-90 mesh); carrier gas: helium, and flame ionisation detector. The content of 4-methyl imidazole is calculated on the basis of the peak areas by comparing with those of the authentic standards. Recently, Carnevale¹⁸ has described an improved method for the determination of 4-methyl imidazole in caramels. In this method, the imidazole is separated by a cation exchange column followed by conversion into the acetyl derivative which is subsequently determined by GLC using imidazole as the internal standard. In the same year, Fuchs and Sundell¹⁸ also described a quantitative gas chromatographic method for the determination of 4-methyl imidazole after conversion into 1-acetyl derivative and employing 2-methyl imidazole as internal standard. The smallest amount of 4-methyl imidazole that can be determined by the above method is 10mg/kg.

The above methods of determination of 4-methyl imidazole content in caramels need standardization when extended to beverages like colas, root beer, etc. With a view to providing a safe caramel to the consumer, the caramel used in the various

foods should conform to the FAO/WHO specifications.

Summary and Conclusions

Caramel colour is used in soft drinks like cola, root beer, etc. for its colour value while in bakery, confectionery and alcoholic beverages for both colour and flavour. The colour of a caramel depends to a large extent on the nature of the starting sugar material and also on the processing conditions. Liquid corn syrup yields a caramel suitable for the soft drinks while cane sugar for bakery, confectionery and alcoholic beverages. Despite the fact that the details of the manufacture of caramel colour are available, the chemical reactions which are involved in the same are not clearly understood.

In the recent years, caramels with guaranteed quality with respect to colour, acid proofness, mineral contents, stability, etc. are available for specific end uses. The colour is an important property of the caramel and it is determined by visual or spectrophotometric methods. Caramels are sold in different colour intensities such as single strength, double strength, etc. 4-methyl imidazole, a suspected toxic compound, is known to form in caramels prepared by the ammonia process. Recently, the FAO/WHO have specified the limit of 4-methyl imidazole at 200 mg/kg of caramel and suggested the maximum acceptable daily intake of caramel for man as 100 mg/kg body weight. Reliable methods are available for the determination of 4-methyl imidazole in caramels but they need extension to the finished beverages. The determination of caramel content in foods is difficult because of the availability and use of the different grades (colour strengths) of caramel in them. With a view to providing a safe caramel to the consumer, the caramel marketed in the country should conform to the FAO/WHO specifications.

Acknowledgements

The authors wish to thank Dr D. S. Bhatia, Director, R & D Corporate, The Coca-Cola Co., Atlanta, U.S.A. and Dr R. S. North, Vice-President, Sethness Products Co., Clinton, U.S.A., for their help in providing some of the source materials and Dr B. L. Amla, Director, CFTRI, for his keen interest in the work.

REFERENCES

1. North, R. S., *Flav. Ind.*, 1973, **4**, 337; *Encyclopaedia of Food Technology*, AVI Pub. Co. Inc., Westport, Conn., 1974, p. 152.
2. North, R. S., *Canner Packer*, 1969, **138** (5), 22.
3. Woodroof, J. G. and Phillips, G. F., 'Beverages: carbonated and non-carbonated', AVI Pub. Co. Inc., Westport, Conn., 1974.
4. Fetzer, W. R., *Ind. Eng. Chem.*, 1953, **45**, 1175.
5. Hodge, J. E., *J. Agr. Food Chem.*, 1953, **1**, 928.
6. Peck, F. W., *Food Eng.*, 1955, **27**(3), 94.
7. Fetzer, W. R., *Ind. Eng. Chem.*, Anal. Edn., 1938, **10**, 349.
8. Lees, R. and Jackson, B., 'Sugar confectionery and chocolate manufacture', Leonard Hill Books, U.K., 1973, p. 42.
9. Linner, R. T., *Proc. 17th Ann. Meeting, Soc. Soft Drink Technol.*, Orlando, Florida, May 6, 1970, p. 63.
10. *Food Chemicals Codex*, 2nd Edn., National Academy of Sciences, Washington, D. C., 1972, p. 865; p. 929.
11. *WHO Food Additives Series*, No. 7, World Health Organization, Geneva, 1976.
12. AOAC, *Official Methods of Analysis*, Horwitz, W., Ed., AOAC, Washington, D. C., 1975, (a) Sec. 20.100, p. 366; (b) Sec. 33.106, p. 621; (c) Sec. 9.029, p. 156; (d) Sec. 25.103, p. 451; (e) Sec. 33.057, p. 614.
13. Carnevale, J., *Food Technol.* (Australia), 1975, **27**, 165.
14. *WHO Food Additives Series*, No. 1, World Health Organization, Geneva, 1972.
15. Nishie, K., Waiss, A. C. and Keyl, A. C., *Toxicol. Appl. Pharmacol.*, 1969, **14**, 301; 1971, **17**, 1.
16. North, R. S., Sethness Products Co., Clinton, U.S.A. (Private Communication).
17. Wilks, Jr., R. A., Shingler, A. J., Thurman, J. S. and Warner, J. S., *J. Chromatog.*, 1973, **87**, 411.
18. Fuchs, G. and Sundell, S., *J. Agr. Food Chem.*, 1975, **23**, 120.

STUDIES ON PEANUT BUTTER—A FEASIBILITY REPORT AND VARIETAL TRIALS

S. NEELAKANTAN AND G. MANIMEGALAI

(Dept. of Food Technology, T.N.A.U., Coimbatore-3)

Introduction

Proteins are one of the essential components of our diet and have to be included in each meal. It has been well recognised that protein deficiency of the diet particularly of young children is one of the major nutritional problems of India and other developing countries. Some of the important rich sources of proteins besides animal foods are pulses, oilseeds and nuts. The common cereals are relatively poor sources of proteins. However, considering the amounts of these foods that are normally consumed daily, their contribution to the total protein intake by an individual becomes considerable. Although constant attempts are being made to increase the agricultural production in our country with respect to leguminous crops, there is an urgent need to augment the protein food supplies by tapping all available sources.

Table 1 shows the production of major oilseeds and their potential protein supply¹. Groundnuts hold a predominant position both in the quantity of production and in their potential protein supplies in the Indian subcontinent. Total production of groundnut kernels in our country is 3.4 million tonnes as compared to the world figure of 11.3 million tonnes. This amounts to an approximate protein equivalent of 0.9 million tonnes, i.e., half the amount of total protein supplies available from oilseeds in India.

In our country, groundnut is primarily considered only as an oilseed and it is mostly pressed for oil and only a small quantity of

TABLE 1. *Production of major oilseeds and their potential protein supply¹*

	World		India	
	Total production	Protein equivalent*	Total production	Protein equivalent
	(Metric tons × 10 ⁶)			
Soybean	43.6	16.6	—	—
Cottonseed	21.2	4.2	2.1	0.4
Groundnut (Kernel)	11.3	2.9	3.4	0.9
Sunflower	9.9	1.4	—	—
Rape and Mustard	5.7	1.1	1.6	0.3
Sesame	1.6	0.3	0.4	0.08
Copra	3.2	0.2	0.27	0.02
Total	96.5	26.7	7.77	1.70

* Protein conversion: Soybean, 38 per cent; Cottonseed, 20 per cent; Groundnut kernel, 25.6 per cent; Sunflower, 14.5 per cent; Rape and Mustard, 18.5 per cent; Sesame, 20 per cent; and Copra, 7.5 per cent.

the oilseed is directly used as food. If used efficiently, a major portion of this oilseed protein can be utilised to improve the diets of the people both in quality and quantity. The *per capita* consumption of groundnut eaten as nut in our country has been estimated to be less than 5 g/day². Further, the production of oilseed cake from this source alone has been estimated to be approximately 2 million tonnes. After the extraction of oil, the cake is being used as cattlefeed or as manure. There is an enormous amount of wastage during the

conversion of plant proteins into animal proteins and this system is economically highly inefficient and is not at all suited to poor nations.

Groundnuts have been generally recommended as being relatively inexpensive source of protein. Further, as an oilseed, it has the advantage of not containing any known toxic factors. Groundnuts grow well in our country and hence can be cultivated to the great advantage of our economy. Peanuts and peanut butter have found wide acceptance as human foods in western countries. Approximately, 460 million pounds of peanut butter is manufactured in U.S.A. annually³. It has also been demonstrated that large proportions of peanut protein concentrates can be fed to children and adults without any ill effects⁴. Significant progress has been made in the utilisation of deoiled cakes for the production of edible grade flours, protein isolate, Indian Multi Purpose Food, weaning foods like Bal-Ahar etc. at the Central Food Technological Research Institute, Mysore^{5,6}.

Peanut butter has been defined as a cohesive, comminuted food product prepared from dry roasted, sound mature peanuts from which seed coat and germ are removed and to which salt, hydrogenated fat, emulsifiers (optional), sugar, salt and antioxidants are added⁷. Modern Bakeries in India have attempted production of peanut butter in our country. Except for this, there has been no significant concerted attempts for commercial production and popularisation of this product in our country at present. Efforts are being made at the Department of Food Technology, Tamil Nadu Agricultural University, to popularise peanut butter. In this paper, the data collected on the different varieties of peanuts used, manufacturing process and the storage stability of the product are presented. Based on these data a feasibility report has been prepared for a small scale industry.

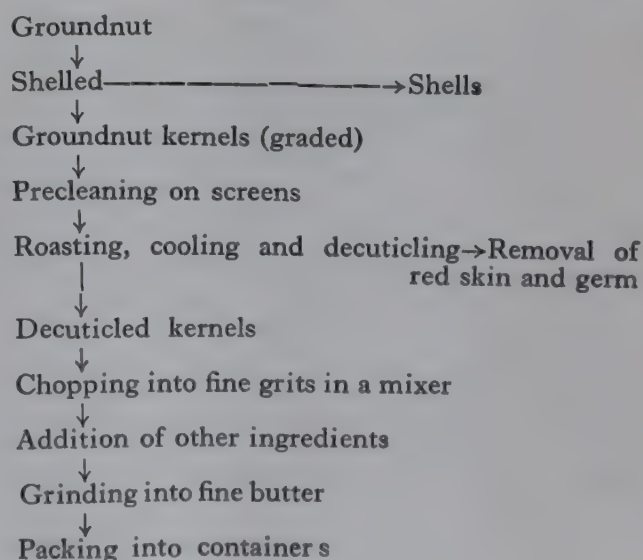
Materials and Methods

Four groundnut varieties, viz., POL I, POL II, TMV 7, Ah. 7911, popularly grown in the Tamil Nadu region were used in these studies. The recipe used for the preparation is given in Table 2 and it was standardised with the help of a taste panel. The process flow sheet is given in Figure 1. The

TABLE 2. *Ingredients for the manufacture of peanut butter*

Shelled, roasted, decuticled peanut grits	100 kg
Salt	1.5 kg
Sugar	2.0 kg
Glucose	2.0 kg
GMS (emulsifier)	1.25 kg
Vanaspati	5.0 kg

Fig. 1. *Flow diagram for the production of peanut butter*



process is simple and consists of the following steps. Raw peanuts were passed through the sheller to remove the shells and the kernels were roasted in a hand operated rotary roaster. The degree of roasting was controlled by observing the colour of the kernels. The red skin and germs were removed and the split kernels were first ground in a high speed blender into small grits. These grits were then finely ground into a pasty butter like consistency in an

iddli grinder (stone mill used for the wet grinding of foodgrains). The other ingredients like salt, sugar, dextrose, etc. were added little by little during the course of the grinding to get an efficient mix up of the ingredients. The product was transferred to glass bottles and stored at room temperature and at 30°C.

Stability of the emulsion during storage was recorded by measuring the depth of the separated oil that was standing on top directly with a graph sheet pasted on the side of the bottle. The determinations of moisture, proteins, fat and ash were done by AOAC methods⁸.

Peanut butter was incorporated into some traditional South Indian dishes like *upma*, *murukku*, *chapathi*, *pakoda*, diamond cuts, *ladu* etc. at 10 and 20 per cent levels and the products were evaluated organoleptically.

Results and Discussion

Addition of glycerol monostearate (GMS) had a profound effect on the stability of the emulsion as can be seen from Figure 4. For room temperature storage, addition of GMS at 1 per cent level has prevented any oil separation during a period of 12 weeks storage. But for elevated temperature storage addition of GMS at 2 per cent level was found essential to prevent oil separation.

In literature, vanaspati (hydrogenated oil) has invariably been recommended as a stabiliser of the emulsion⁹. The effect of addition of vanaspati alone at different levels in the absence of an emulsifier are shown in Figures 2 and 3. In our experiments, the results were somewhat erratic and an optimum vanaspati concentration could not be prescribed.

Composition of the different varieties of peanuts used in the study and the organoleptic evaluation scores of the peanut butter are shown in Table 3. During the taste panel evaluation significant differences between peanut butters of different varieties could not be observed. The untrained panel found that all the varieties were uniformly well acceptable.

Inclusion of peanut butter in the traditional South Indian dishes proved quite successful in *chapathi*, *murukku*, *pakoda* and diamond cuts. Incorporation of peanut butter at 10 per cent level in *chapathi* was liked by all the judges. It gave quite a soft textured product even without the addition of any extra shortenings. In the case of *pakoda* and *murukku*, addition of peanut butter at 10 per cent level did not show any difference from the control. Addition at higher levels were found not quite acceptable by the judges. In diamond cuts, addition at 20 and 40 per cent levels

TABLE 3. Composition and organoleptic evaluation of different varieties*

Varieties	Moisture %	Fat %	Protein %	Ash %	Carbohydrates (by difference) %	Organoleptic evaluation scores† (Peanut butter)	
						Taste	Flavour
POL I	3.27	56.0	32.0	2.56	6.17	5.0	4.5
POL II	3.30	55.6	32.5	2.28	6.32	4.6	4.0
TMV 7	3.27	51.4	28.0	2.88	14.45	4.7	4.2
Ah. 7911	3.43	49.26	33.0	2.46	11.85	4.33	4.83

* Composition of raw kernels.

† Taste panel scores of peanut butter.

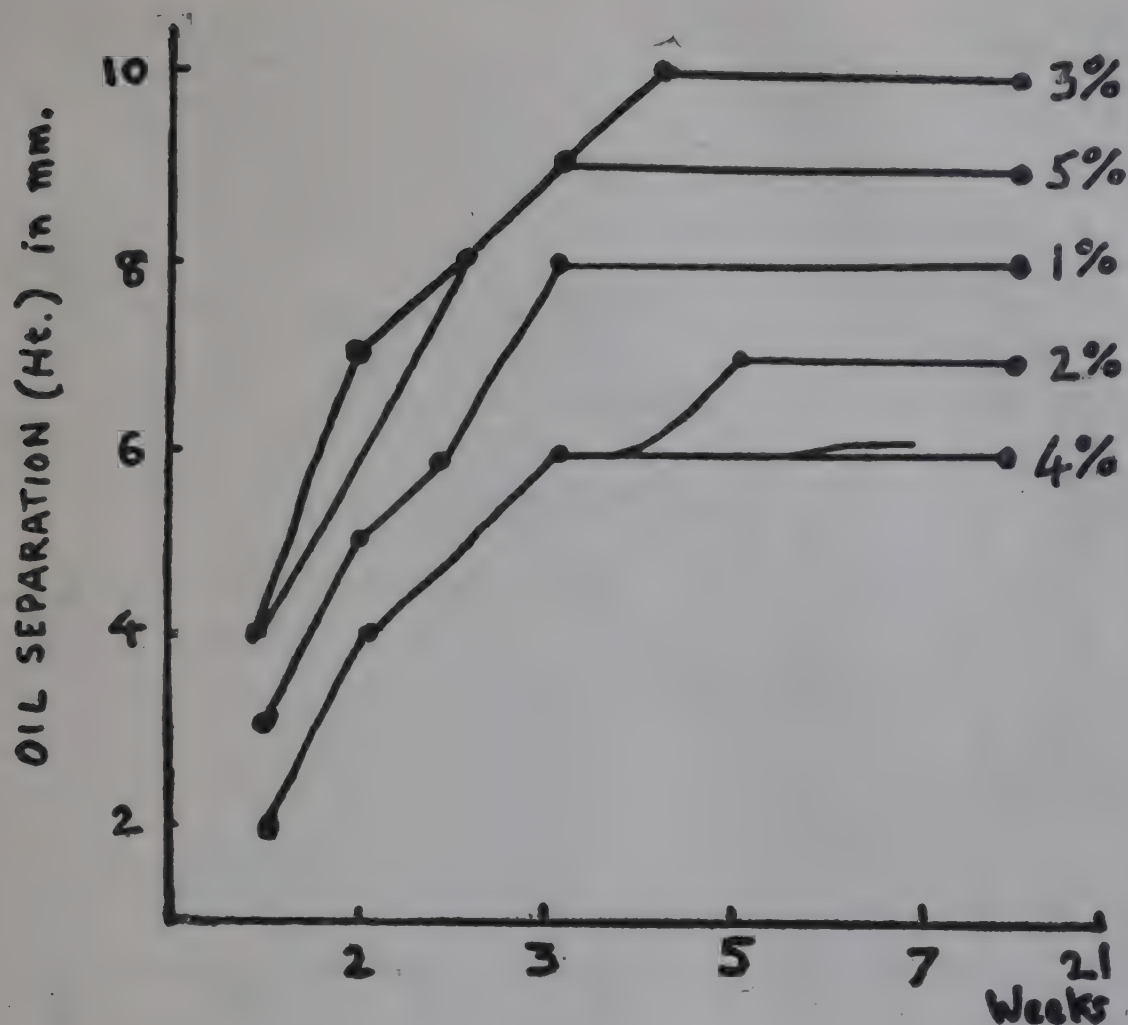


FIG. 2. Effect of conc. of vanaspati (R.T.)

produced a soft and crispy biscuit like texture. The flavour of peanuts were well incorporated. However, addition of peanut butter was found not acceptable in *upmav*, and *ladu*. Peanut butter is a rich source of protein. Further, it also supplies good amounts of essential vitamins and minerals. It has a high supplementary value to cereal based diets. It can be used as a spread on bread for making sandwiches in many baked goods and besides we have shown that can be used in various South Indian dishes as well. Further work is in progress in this direction and also in improving the emulsion stability during storage.

Feasibility Report

Based on the trial runs, a feasibility report has been prepared for a small scale industry.

Cost Estimates

The cost estimates have been calculated on the assumption that 200 kg of raw nuts will be handled in a working day of two shifts with a total number of 300 working days per annum.

I. Fixed costs (Capital outlay)

Land and Building	Rs 20,000.00
-------------------	--------------

Machineries

Sheller		
Roaster		
Preliminary Mill		
Fine Grinder (2 Nos.)		
Weighing scales		Rs 25,000.00
Accessories @ 10 per cent	Rs 2,500	
Installation @ 20 per cent	Rs 5,000	
Power, water supply		
@ 10 per cent	Rs 2,500	Rs 10,000.00
Total		Rs 55,000.00

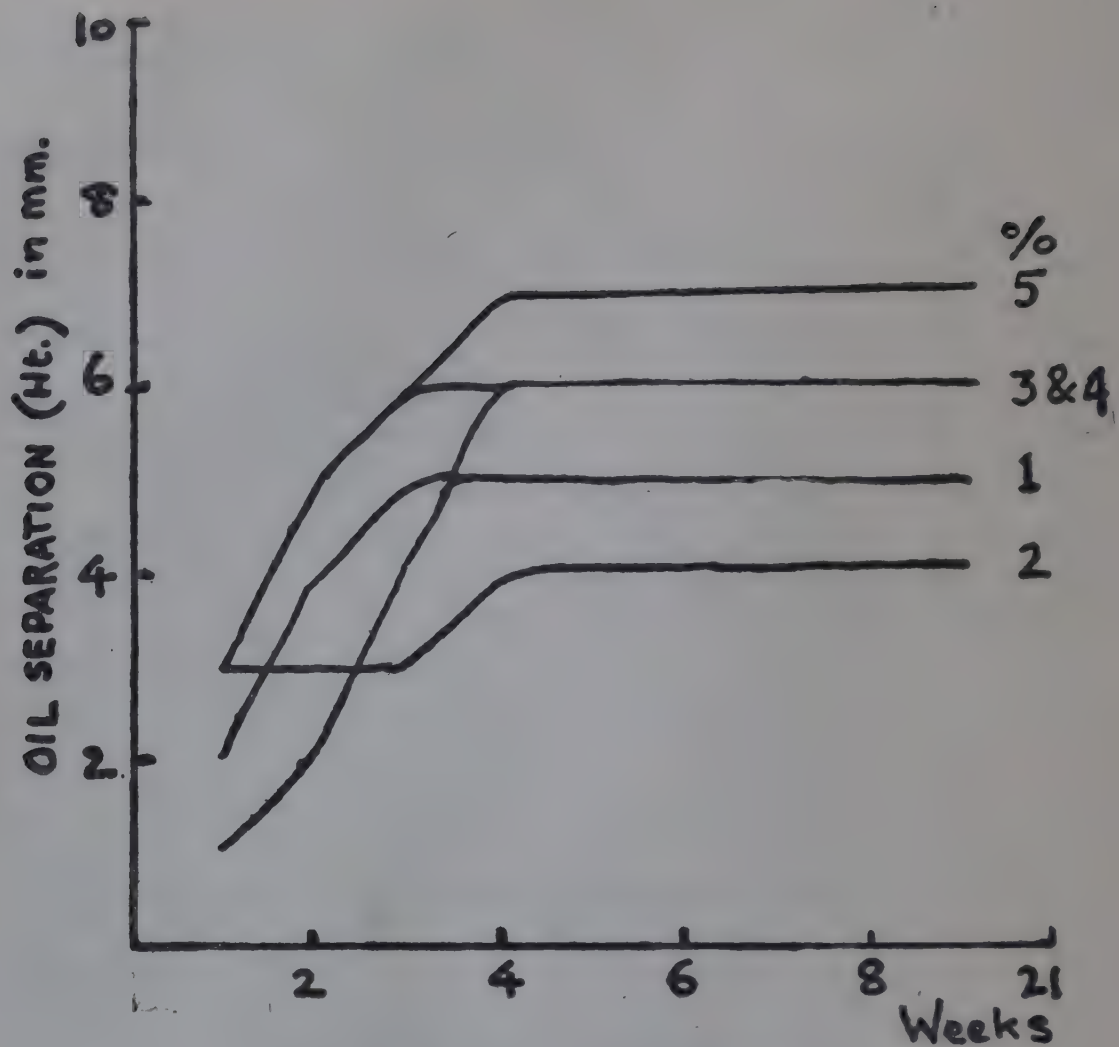


FIG. 3. Effect of conc. of vanaspati (30°C)

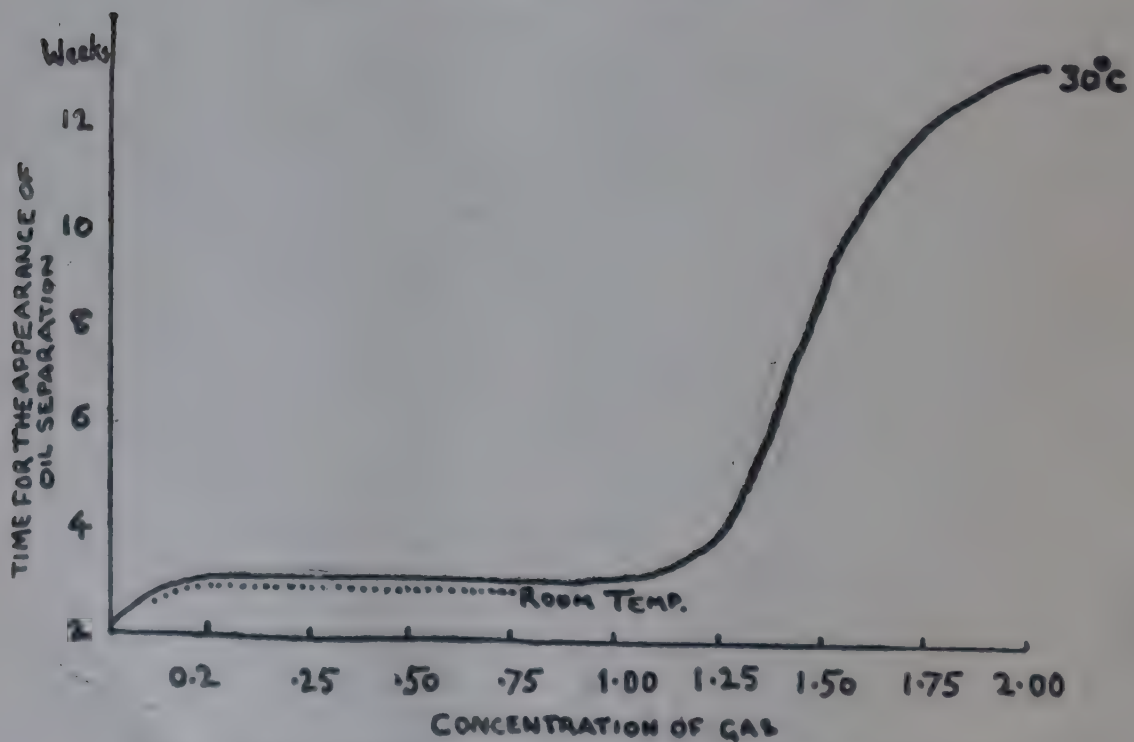


FIG. 4. Effect of GMS conc. on storage stability of the peanut butter (Perceptible appearance of oil layer)

II. Operating costs (per day of 2 shifts)

(a) Cost of peanut 200 kg (shelled)	600.00
(b) Cost of bottles, 1200 Nos. with screw caps @ Rs 0.30/bottle	360.00
(c) Cost of other ingredients	226.00
(d) Servicing and maintenance charges @ 5 per cent of outlay	9.20
(e) Fuel and other energy inputs @ 10 per cent of outlay	18.40
(f) Power and water supply @ 7½ per cent of outlay	13.80
(g) Labour charges (8 Nos.)	48.00
(h) Transportation @ 5 per cent of outlay	9.20
(i) Administration @ 10 per cent of outlay	18.40
	1303.00

III. Other overheads:

(a) Depreciation @ 5 per cent of outlay	9.20
(b) Interest @ 20 per cent of outlay	36.80
	46.00

IV. Total operating costs	1349.00
Profit @ 10 per cent of cost	134.90
Total operating cost/day	1483.90
Total yield of peanut butter—1200 bottles of 150 g each	

V. So sale price of product/bottle: Rs 1.24

As can be seen, the major portion of the cost is that of raw material and this is a varying cost depending upon the current market price. Barring Modern Bakeries, there has been no commercial production of peanut butter in our country at present. There is a very good potential for such a product, which has a delicious flavour and high nutritive value.

Finally, a word of caution should be added with regard to groundnuts. It has been

particularly prone to the infestation with a mold *Aspergillus flavus*, which produces aflatoxin, if the nuts are stored under humid and unhygienic conditions.¹⁰ So proper drying of the harvested nuts and careful storage of the commodity is necessary. Only clean wholesome nuts should be used in the preparation of peanut butter.

REFERENCES

1. Subramanian, N., *Proc. Workshop on the utilisation of groundnut and other oilseeds for edible purposes*, Mysore, Oct. 25-27, 1971, p. 34.
2. Rajalakshmi, R., *Applied Nutrition*, University of Baroda Press, 1967.
3. Altschul, A. M., *Proteins, their Chemistry and Politics*. Chapman and Hall, London, 1958, p. 293.
4. Rosen, G. D., in *Processed Plant Protein Foodsuffs*, Ed. Altschul, A. M., Acad. Press Inc., N.Y., p. 424.
5. Subrahmanyam, V., Rajagopalan, R. and Swaminathan, M., *Sci. Cult.*, 1959, 25, 460.
6. Anantaraman, K., Subramanian, N. and Subrahmanyam, V., *Food Sci.*, 1962, 11, 1.
7. Johnson, K. B. and Peterson, M., *Encyclopedia of Food Technology*, AVI Pubg. Co. Inc., Connecticut, U.S.A., 1974, Vol. II, p. 683.
8. AOAC, *Official Methods of Analysis*, AOAC, Washington D.C., 10th Edn., 1965.
9. Woodroof, J. G., *Peanuts: Production, Processing and Products*, AVI Pubg. Co. Inc., Connecticut, U.S.A., 1973, p. 174.
10. Parpia, H. A. B. and Sreenivasamurthy, V., *3rd Intl. Congress of Food Sci. and Technol.*, Washington, D.C., Aug 9-14, 1970, p. 701.

EFFECT OF RIPENESS OF TOMATO ON THE COLOUR OF KETCHUP

PAIRAT NARKVIROJ* AND S. RANGANNA

(Central Food Technological Research Institute, Mysore-570 013)

Abstract

During ripening of tomatoes, chlorophyll decreases, while lycopene—the carotenoid responsible for the red colour,—increases. Apart from lycopene content, the most important factor affecting the ultimate colour of the tomato ketchup is the residual chlorophyll content of the juice used in the preparation. Hence, chlorophyll content of fresh juice is a better index of the quality of the resulting ketchup. Chlorophyll content and colour data for juice which would give a ketchup equivalent to U.S. Grade A (Fancy) or Grade B (Extra Standard) and Grade C (Standard) have been given.

Introduction

Tomato ketchup is a very popular product manufactured from tomato in many parts of the world. Consumers associate the red colour of the processed tomato products with optimum maturity of the fruit used, and consequently with better flavour. Conversely, a brown product is indicative of the use of less mature fruit which would impart a bitter taste. This is principally due to the colour of the fresh tomato which is an index of its maturity, and indirectly related to flavour development.

Many different types of pigments have been isolated in the tomato fruit, but of major importance to overall colour, are α -carotene, β -carotene, γ -carotene ζ -carotene, lycopene and 22 xanthophylls¹. The most abundant carotenoid of the tomato is lycopene, which comprises of approximately 83 per cent of the pigments present¹.

A number of workers²⁻⁵ have investigated the changes in the pigments during maturation, which contribute to the colour of the tomato. Sando² and Dalal *et al*³ found that chlorophyll continued to increase as size and maturity of the fruit increased but decreased as the fruit started acquiring pink colour. Rabourn and Quackenbush⁴ found that lycopene which contributes to the red colour of the tomato is not present in green tomato. Meredith and Purcell⁵ found that α -carotene and β -carotene were the only carotenes present at the mature green stage. Phytofluene, ζ -carotene, γ -carotene and lycopene were found at the breaker stage. Phytoene, phytofluene, γ -carotene and ζ -carotene increased in concentration through all the stages of maturity. α -carotene increased in concentration until the breaker stage; then decreased as the fruit became red. β -carotene was found to increase in concentration through all the

* This work was submitted by the senior author as part of the course-work leading to M.Sc. (Food Technology) degree of the Mysore University.

stages of maturity until the light red stage and then decreased. Dalal *et al*³. have made similar observations with regard to changes in β -carotene and found lycopene to increase during ripening.

With the prohibition of added colour to tomato ketchup, manufacturers have been experiencing considerable difficulty in preparing ketchup having good colour. The purpose of this investigation is to study the chlorophyll and carotenoid contents in tomatoes at different stages of ripening, and to correlate the colour of the juice with that of the ketchup.

Experimental

Raw material

Tomatoes of varying maturity purchased from the local market were sorted on the basis of colour into (i) green, (ii) yellowish green, (iii) yellow, (iv) reddish yellow, (v) red with yellow patches, (vi) red and (vii) red-ripe.

Preparation of ketchup

The fruits were washed thoroughly, cored and sliced in a Stephan's machine. Juice was extracted from a representative portion of the slices for analysis. The slices were heated and pulped in the Stephan's machine.

The ketchup was prepared according to the following recipe:

Tomato juice	..	5680 g
Sugar	..	341 g
Salt	..	57 g
Onion	..	71 g
Garlic	..	6 g
Clove	..	3 g
Cinnamon	..	3 g
Black pepper	..	1 g
Cumin	..	1 g
Mace	..	0.2 g
Red chilli powder	..	1.2 g

Onion, garlic, chilli powder and the ground spices were tied in a cloth bag and

placed in the juice. One-third the calculated quantity of sugar was added to the juice and heated until the TSS were 15 to 18 per cent when the salt and the remaining amount of sugar were added. The mass was boiled further with constant stirring. Just before the end, calculated quantity of glacial acetic acid was added, and the product finished at 25 per cent TSS. Sodium benzoate equivalent to 600 ppm of benzoic acid was added to the final product. The ketchup was filled hot (90°C) into bottles, crown corked and kept inverted for 10 min prior to cooling. One set of bottles were stored at room temperature (about 25°C) and another set at 37°C.

Analytical methods

Samples of raw and heated juices and fresh and stored samples of ketchup were analysed.

Chlorophyll

Total chlorophyll was estimated according to the procedure outlined by AOAC.⁶ The colour was measured in a Beckman DU spectrophotometer at 660 and 642.5 nm.

Carotenoid pigments

β -carotene was separated from other carotenoid pigments by the column chromatographic procedure of Association of Vitamin Chemists⁷ using Hyflosupercel and magnesium oxide (3:1) as adsorbent and petroleum ether containing 3 per cent acetone as eluant. β -carotene, which moved off the column, was made to a known volume. The total carotenoids and β -carotene were measured in a Beckman DU spectrophotometer at 473 nm, the absorption maximum of lycopene. The total carotenoid and the carotene contents were calculated in terms of lycopene using the molecular extinction coefficient which at 473 nm is 18.6×10^4 . The lycopene content was calculated by subtracting the

carotene content from the total carotenoid content.

Colour measurement

(i) *Reflectance colour*: Reflectance colour of raw and heated juices, and ketchup was measured in a Bausch and Lomb Spectronic-20 Colorimeter with reflectance attachment as described in an earlier paper⁸.

Colour differences (ΔE) were calculated according to Adam's Chromatic value diagram method by the following equation⁹:

$$\Delta E = [(\Delta L)^2 + (\Delta a)^2 + (\Delta b)^2]^{\frac{1}{2}}$$

where

$$L = 9.2 V_y$$

$$a = 40(V_x - V_y)$$

$$b = 16(V_y - V_z)$$

V_x , V_y , V_z are the Munsell functions of X, Y and Z, which were found from reference tables⁹.

(ii) *Redness Index*: The redness index was calculated using the expression

$$\frac{R_{620}}{R_{550} - R_{440}}$$

where R is the reflectance colour at the particular wavelength measured in a Spectronic-20 colorimeter with reflectance attachment using magnesium carbonate as the white reference to set the instrument to 100 per cent reflectance¹⁰.

(iii) *Colour measurement by Munsell System*: The colour of tomato ketchup was also measured in a Macbeth-Munsell Disc-Colorimeter with built-in illumination for viewing the sample.

(iv) *Colour measurement using Lovibond tintometer*: The reflectance colour of the sample was matched in terms of red, yellow and blue units. The blue unit required to match the colour was the lowest and was a measure of the dullness. Hence, the blue units were subtracted from the red and the yellow units, and the results presented in terms of the remaining red and yellow units.

Results and Discussion

Effect of maturity on the chlorophyll and the carotenoid pigments

The chlorophyll content was maximum in the mature green tomatoes and decreased as the colour turned red (Table 1). In the red ripe and fully red tomatoes, the chlorophyll content was only 0.7 per cent and 1.5 per cent of the amount present in the green fruit. The total carotenoid content as well as the lycopene content increased as the fruit ripened and was maximum at the ripe stage (Table 1). These findings were in agreement with the earlier observations³⁻⁵.

TABLE 1. Changes in chlorophyll and carotenoid contents during ripening and processing

Particulars	Chlorophyll mg/100g	Total carotenoids mg/100	Lycopene mg/100 g
<i>Fresh Juice</i>			
Green	1.843	0.265	0.223
Yellowish green	0.492	0.397	0.295
Yellow	0.138	1.985	1.646
Reddish yellow	0.129	2.093	1.732
Red with yellow patches	0.120	2.107	2.082
Red	0.027	2.869	2.689
Red ripe	0.013	3.464	3.157
<i>Heated Juice</i>			
Green	1.467	0.379	0.256
Yellowish green	0.392	0.558	0.287
Yellow	0.100	1.660	1.407
Reddish yellow	0.104	1.841	1.465
Red with yellow patches	0.117	2.294	2.153
Red	0.011	2.364	2.201
Red ripe	0.011	3.789	3.556

Effect of heating on the chlorophyll and the carotenoid pigments

On heating the fruit for the extraction of juice, the chlorophyll content decreased which might be attributed to its break down.¹¹ On the contrary, very little variations were noted in the total carotenoid and lycopene contents.

Effect of maturity and heating on the reflectance colour

The reflectance colour data is shown in Table 2. Increasing ripeness of fruit from green stage to red ripe stage brought about changes in the reflectance colour data of the juice. The x coordinate did not show any particular pattern but the y coordinate decreased steadily. The Y per cent, indicative of the lightness, decreased as the fruit ripened. The colour difference (ΔE), calculated by taking colour of the juice from the green fruit as the reference, increased considerably from 2.74 in yellowish green fruit to 16.85 in fully red ripe fruit. The chroma tended to decrease. With the

change in colour of whole tomatoes from green to red, the dominant wavelength of the juice changed from 577 to 593 nm. The colour changes are obvious from a comparison of the colour plot in Fig. 1 with Maxwell colour mixture diagram in Fig. 2.

As compared to heated juice, Y per cent and chroma of the tomato ketchup further decreased and the dominant wavelength exhibited a bathochromic shift as compared to that of heated juice.

Effect of maturity and heating on the redness index

In a processing factory, detailed analysis of colour as discussed in the previous para-

TABLE 2. Colour data of fresh and heated juices and ketchup prepared from tomatoes of different levels of ripeness

Particulars	x	y	Y %	Dominant wavelength nm	Chroma %	ΔE	Redness index	Tintometer reading	
								Red units	Yellow units
<i>Fresh Juice</i>									
Green	0.3892	0.4013	15.44	577.1	43.94	—*	1.69	1.5	18.8
Yellowish green	0.3926	0.3930	13.84	578.8	43.18	2.74	2.64	4.0	16.8
Yellow	0.4068	0.3691	12.92	585.5	40.15	9.45	4.40	7.1	8.0
Reddish yellow	0.3915	0.3617	10.68	585.5	33.58	12.40	4.60	8.2	9.6
Red with yellow patches	0.4110	0.3589	10.73	589.6	38.46	14.12	6.33	10.6	9.5
Red	0.4401	0.3622	9.66	591.7	36.94	16.73	10.00	12.5	8.5
Red ripe	0.4157	0.3510	10.41	592.8	37.84	16.85	10.67	19.0	6.1
<i>Heated Juice</i>									
Green	0.3867	0.4047	16.21	575.6	44.70	—*	1.80	2.5	16.6
Yellowish green	0.4036	0.3940	16.23	580.0	46.62	1.60	2.53	4.3	16.8
Yellow	0.4033	0.3763	11.13	583.8	41.18	9.88	4.22	8.5	8.5
Reddish yellow	0.4120	0.3663	11.49	587.3	40.71	11.80	4.33	8.3	9.7
Red with yellow patches	0.4096	0.3617	11.03	588.3	38.73	13.14	6.30	10.9	9.4
Red	0.4099	0.3519	10.20	591.7	36.05	14.28	9.60	12.5	8.5
Red ripe	0.4171	0.3543	9.42	591.7	39.46	18.58	9.75	—	—
<i>Ketchup</i>									
Green	0.3832	0.3989	11.16	576.3	41.67	—*	2.15	2.2	11.5
Yellowish green	0.4016	0.3799	11.91	582.7	41.79	4.44	2.64	5.6	11.3
Yellow	0.4132	0.3676	9.73	587.3	40.71	8.83	4.00	7.5	6.5
Reddish yellow	0.4272	0.3687	10.52	588.6	45.07	10.62	4.33	8.9	8.8
Red with yellow patches	0.4139	0.3624	9.44	588.6	39.44	10.19	5.43	11.0	7.7
Red	0.4120	0.3499	8.48	592.8	36.24	13.26	7.40	15.3	7.3
Red ripe	0.4187	0.3485	8.63	594.4	37.09	14.22	9.00	15.4	7.6

*Used as standard for measuring the colour difference of samples from other tomatoes.

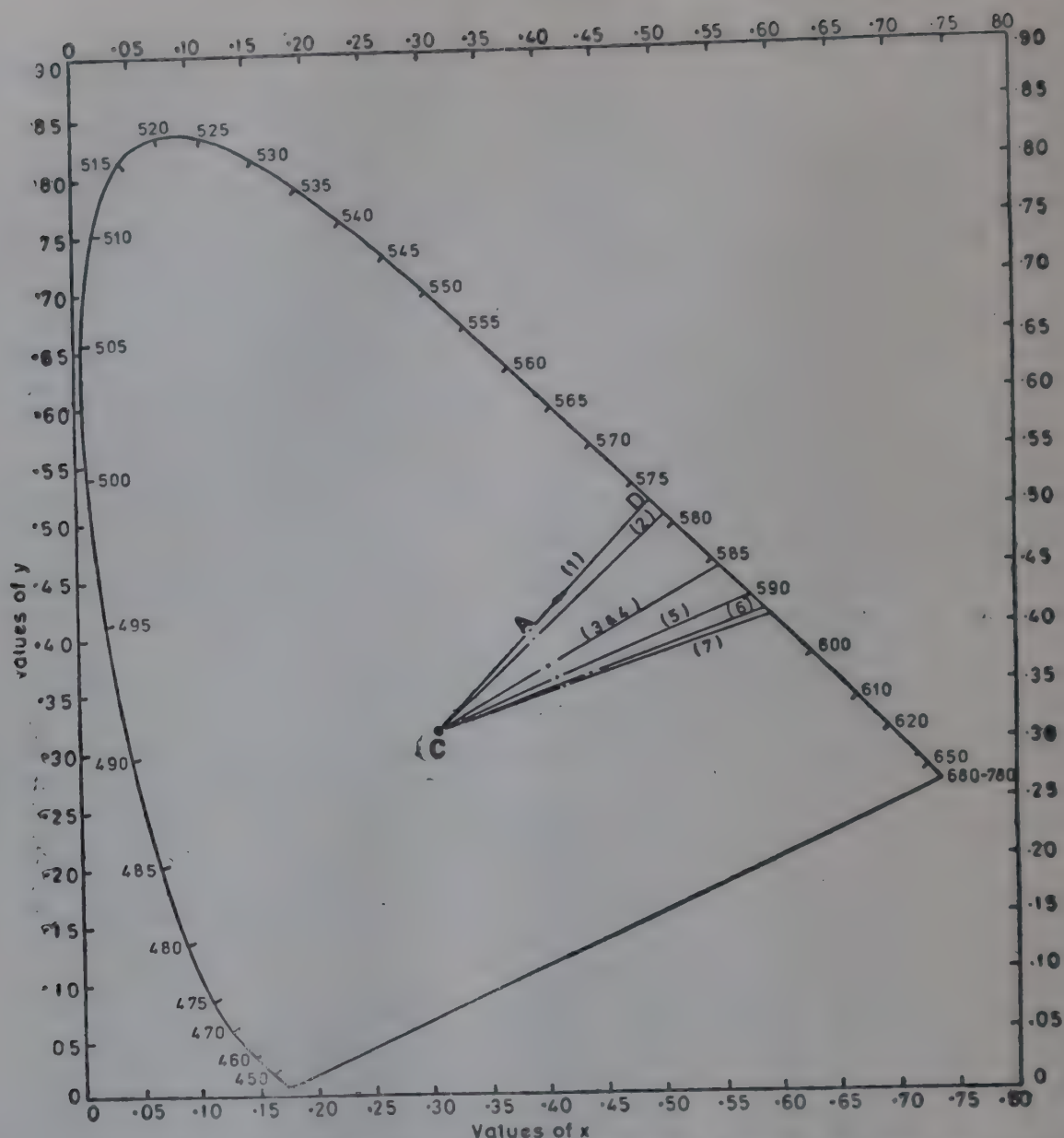


Fig. 1. Reflectance colour plot of raw tomato fruits. Numbers indicate the level of ripeness of tomato used in the extraction of juice.

(1) Green, (2) Yellowish green, (3) and (4) Yellow and Reddish yellow, (5) Red with yellow patches, (6) Red and (7) Red ripe.

C represents the position of the Illuminant-C.

A represents the intercept of the x and y coordinates of the sample.

D represents the dominant wavelength.

graphs would be time-consuming and not normally needed. Goose and Binstead¹⁰ have recommended the measurement of redness index which would place the samples of ketchup approximately in the order of visual ranking. Hence, the same index was used for measuring the colour of the raw and heated juices to establish a simple objective method of colour measurement of juice and to correlate it with the colour of

the finished product. The redness index of juice from fully ripe tomato was 6.3 times of that of juice from unripe green fruit (Table 2). In the heated juice, it was 5.6 times, and in ketchup, 4.2 times. The redness index of the ketchup made from green tomatoes was slightly more than that of the corresponding juice which might be attributed to the formation of brown colour due to the breakdown of chlorophyll to pheo-

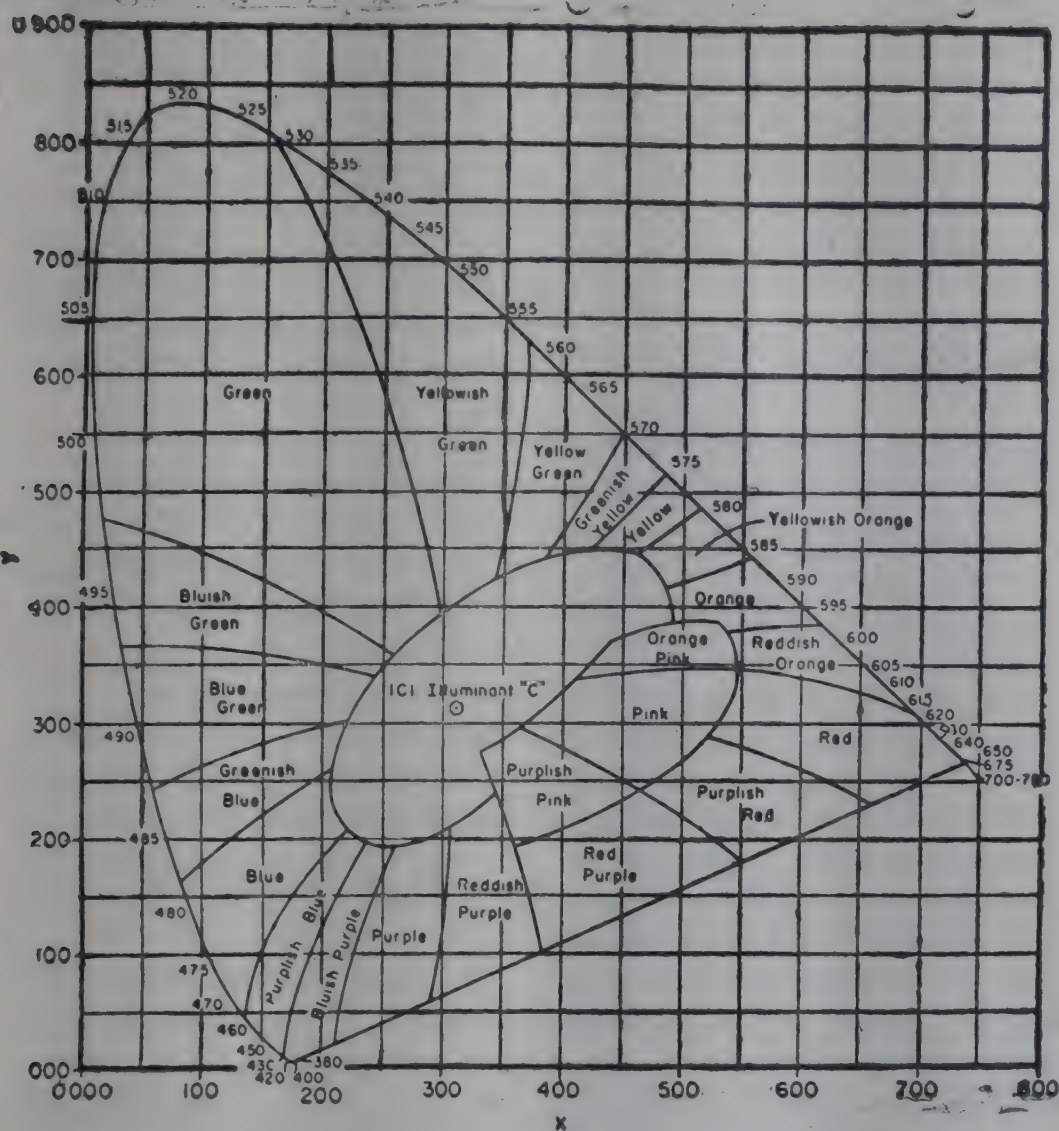


Fig. 2. Maxwell colour mixture diagram

phytin due to acid and heating¹¹. However, in ketchups made from yellow to red ripe tomatoes, the redness index decreased slightly.

Effect of maturity on tintometer reading

In tintometer, the red units required to match the colour of the juice with the change of colour in fruits from green to red increased 7 to 13 folds, and the yellow units decreased by 2 to 3 folds (Table 2). In the heated juices and in ketchups, similar differences were observed.

Effect of maturity on Munsell colour

Although 25 points out of 100 are awarded for colour in the sensory evaluation,

according to Indian Standards Institution (ISI:3882-1966) and U.S. Standards for grades of tomato ketchup, only in U.S.A. objective standards for colour have been specified. The standards are based on comparing the colour of the product with that produced by spinning a combination of the red, yellow, black and grey Munsell colour discs. The Munsell colour values for U.S. Standard Grade A (Fancy) and Grade B (Extra Standard) are the same and different for Grade C (Standard). The particulars are given in Table 3. The colour of the ketchups prepared from green and yellowish green tomatoes could not be matched making use of the discs; from yellow and reddish yellow tomatoes, the red

values were low and the yellow values were more and consequently, the colour was far below Grade C; from red tomatoes which have slight yellow patches, the colour was equivalent to Standard Grade C, while from red or red ripe tomatoes, the colour matched with those of U.S. Standards for Grades A and B.

Factors influencing the colour of tomato ketchup

The ketchup prepared from tomatoes containing yellow patches was equal to U.S. Standard Grade C, while red and red ripe tomatoes without the yellow patches yielded a product equal to Grade A (Table 3). The lycopene content of 2.7 to 3.2 mg per 100 g found in the raw juices from the red and red ripe tomatoes was near the lower range of 2.6 mg to 12.5 mg per 100 g reported in the literature^{3,5,12,13}. Hence, the lycopene content of the tomato used alone does not determine the ultimate colour of the ketchup. What really affects the colour is the level of ripeness of the tomatoes used and the residual chlorophyll content. The red tomatoes with yellow patches contained 0.12 mg of chlorophyll per 100 g which resulted in a

product equivalent to U.S. Standard Grade C, while red and red ripe tomatoes contained 0.027 and 0.013 mg of chlorophyll per 100 g respectively yielding a product equivalent to U.S. Standard Grade A. Tomatoes having chlorophyll content of 0.03 mg per 100 g or lower and lycopene content higher than 2.7 to 3.2 mg per 100 g used in the present study might, at the most, yield a product having more red colour.

Effect of storage on colour

The Munsell red decreased, while the yellow increased in ketchup prepared from yellow and reddish yellow tomatoes stored at room temperature or 37°C (Tables 3 and 4). In ketchups prepared from red and fully red tomatoes, these values were constant indicating that they still satisfied the specifications for U.S. Standard Grade A tomato ketchup.

Colour parameters of juice for the preparation of ketchup

In India, only minimum standards have been laid down under the Fruit Products Order specifications but not the quality standards. The quality standards for

TABLE 3. *Munsell colour standards for tomato ketchup in U.S.A. and Munsell colour readings of samples of ketchup prepared from tomatoes of different levels of ripeness*

Particulars	Disc 1—Red (5 R 2.6/13) (glossy finish)	Disc 2—Yellow (2.5 YR 5/12) (glossy finish)	Disc 3—Grey (N 4) (mat finish) Disc 4—Black (N1) (glossy finish)
	per cent	per cent	per cent
Tomato ketchup U.S. standard Grade A (Fancy) and Grade B (Extra-Standard)	65	21	14
Tomato ketchup U.S. standard Grade C (Standard)	53	28	19
Laboratory samples prepared from—			
green tomatoes	†	†	†
yellowish green tomatoes	†	†	†
yellow	25	56	19
reddish yellow	26	55	19
red with yellow patches	53	30	17
red	68	18	14
red ripe	69	17	14

† The colour could not be matched with the discs 1 to 4 specified above.

TABLE 4. *Changes in Munsell colour of tomato ketchup after storage for three months**

Particulars	Storage temp. °C	Red %	Yellow %	Grey and black %
Ketchup prepared from				
Green tomatoes	25	†	†	†
Yellowish green	38	†	†	†
Yellowish green tomatoes	25	†	†	†
	38	†	†	†
Yellow tomatoes	25	20	61	19
	38	21	60	19
Reddish yellow tomatoes	25	22	59	19
	30	21	60	19
Red with yellow patches	25	na	na	na
	38	na	na	na
Red tomatoes	25	67	19	14
	38	67	19	14
Red ripe tomatoes	25	69	17	14
	38	68	18	14

* See Table 3 for initial values.

† The colour could not be matched with the discs mentioned.

na=Samples not available.

TABLE 5. *Parameters of colour for fresh tomato juice suitable for preparing ketchups conforming to U.S. Standards Grade A and C*

Particulars	Grade A	Grade C
Chlorophyll, mg/100 g	>0.027	>0.120
Redness index = $\frac{R_{620}}{R_{550}-R_{440}}$	>10.0	>6.3
Tintometer reading:		
Red units	12.5-19.0 or higher	10.6 or higher
Yellow units	8.5-6.1 or lower	9.5 or lower
Dominant wavelength* (nm)	>592	>589.6

* Determined by reflectance colour measurement.

colour laid down under Indian Standards Institution specification is subjective. Taking the objective standards laid down in U.S.A. for colour of tomato ketchup for grades A or B and C as the basis (Table 3),

the chlorophyll content and colour data for raw juice given in Table 5 provide an index of the suitability of the raw material for preparing the ketchup. The data presented in Table 5 are based on the variety available in the local market and have to be extended to other varieties.

Conclusions

During ripening of tomatoes, with the changes in colour from green to red, chlorophyll decreases, while the total carotenoid and the lycopene contents increase. Application of heat during extraction of juice and preparation of ketchup causes considerable decrease in chlorophyll content. The use of red tomatoes having slight yellow patches yielded ketchup equivalent to U.S. Grade C (Standard), while red and red ripe tomatoes yielded ketchup equivalent to U.S. Standard Grade A (Fancy) and Grade B (Extra Standard) for colour. The chlorophyll content of red tomatoes with yellow patches was 0.12 mg per 100 g as compared to 0.027 mg and 0.013 mg in red and red ripe tomatoes respectively which causes grade differentiation in the quality of the finished product. No significant changes were observed in the colour of ketchup prepared from ripe tomatoes during storage at 37°C for 3 months.

Rather than lycopene content, chlorophyll content of fresh juice is a better index of quality of the resulting tomato ketchup. Chlorophyll content and colour standards for juice which would give a product equivalent to U.S. Grades A and C have been given.

Acknowledgement

The authors are thankful to Dr B. L. Amla, Dr S. P. Manjrekar and Shri Lakshminarayana Setty for their keen interest in this investigation. The assistance rendered by Shri B. Srinivasan in reflectance colour measurement is gratefully acknowledged.

REFERENCES

1. Gould, W. A., 'Tomato Production, Processing and Quality Evaluation', The AVI Publishing Company, Westport, Connecticut, U.S.A., 1974, p. 228.
2. Sando, C. E., *U.S. Department Agric. Bull.*, U.S.A., No. 859, 1920.
3. Dalal, K. B., Salunkhe, D. K., Boe, A. A. and Olson, L. E., *J. Food Sci.*, 1965, **30**, 504.
4. Rabourn, W. J. and Quackenbush, F. W., *Arch. Biochem. and Biophys.*, 1955, **44**, 159.
5. Meredith, F. I. and Purcell, A. E., *Amer. Soc. Hort. Sci.*, 1966, **89**, 544.
6. Assoc. Offic. Anal. Chem., *Official Methods of Analysis*, 12th Edition, 1975, p. 51.
7. Assoc. Vitamin Chem., *Methods of Vitamin Assay*, Interscience Publishers, New York, 3rd Edn., 1966, p. 97.
8. Ranganna, S., *Indian Food Packer*, 1974, **28** (1), 5.
9. Mackinney, G. and Little, A. C., *Colour of Foods*, The AVI Publishing Co., Inc., Westport, Connecticut, U.S.A., 1962, p. 232.
10. Goose, P. G. and Binsted, R., 'Tomato Paste and Other Tomato Products', Food Trade Press Ltd., 7, Garrick Street, London, 1973, p. 181.
11. Braverman, J. B. S., 'Introduction to the Biochemistry of Foods', Elsevier Publishing Co., New York, 1963.
12. Boe, A. A., Do, J. Y. and Salunkhe, D. K., *Indian J. Hort.*, 1967, **24**, 160.
13. Goodwin, T. W. and Jamikorn, M., *Nature*, 1952, **170** (4316), 104.

TULIP PRODUCTS COMPANY

IMDAD ALI LANE

CALCUTTA-700 016

Phone: 24-5948

B. O. SANATNAGAR

Srinagar-5, KASHMIR

Phone: 4032

Fruits: Pears, Peaches, Cherries, Strawberries, Fruit Cocktail, Victoria Plum, Greengage, etc.

Vegetables: Asparagus, Sauerkraut, Baked Beans, Dil Gherkins, Garden peas, Mixed Vegetable, etc.

Soups: Tomato, Vegetable, Celery, Mushroom, Pea, etc.

Jams: Strawberry, Raspberry, Redcherry, Apricot, Pineapple, Mixed Fruit, etc.

Squashes: Orange, Lemon, Mango, Pineapple, etc.

And also Sauces, Jelly Crystals, Peanut butter, Pearl Onion, Salmons, etc.

Book Reviews

Quality Control in Food Service: by MARVIN EDWARD THORNE AND PETER BURMAN MANNING (1976), published by AVI Technical Book Inc., 250, E State Street, Westport, Conn 06880, pp. 368, U.S. \$ 14.00 (soft), 26.00 (cloth).

The book under review is having fifteen chapters. In the first chapter, authors have described the importance of quality control progress. These will ensure consumer satisfaction, increase the morale of the employee and also productivity. In the next chapter, the use of human senses and instruments like weighing machines, thermometers, hydrometers, refractometers, etc., in implementing quality control have been described. In the third chapter on preparation and production equipments, how the quality factors like colour and flavour are affected by inefficient operation of them. Also necessary instructions have been provided to evaluate the proper performance of the equipment. With many examples, the authors have described importance of quality control during pre-cooking, cooking and post-cooking (chapters 7, 8 and 9). Two chapters are devoted for the quality control of the products like (1) desserts and baked products, and (2) non-alcoholic beverages.

The topics of importance like food spoilage and sanitation, water and vending machines are discussed in chapters 12, 13 and 14.

Energy control and conservation and its relation to quality control programme are described in Chapter 15.

For the convenience of the readers, Glossary, Appendix, References and Index are given in the end.

This is a useful book for the managers and persons engaged in big canteens and hotels and an ideal text book for students and teachers of catering and hotel management.

S. M. JAMBAGI

Elements of Food Engineering: by JOHN C. HARPER, published by The AVI Publishing Company INC., West Port, Connecticut, pp. 282, U.S. \$ 21.00 (soft) \$ 46.00 (cloth).

The book under review deals with the basic design features of most of equipment and machinery used in the food industry. It has been divided into twelve broad chapters and each chapter has been dealt very ably by the author.

The first chapter gives a basic idea regarding all measuring units and their interrelation with simple problems for their better understanding. The next chapter deals with mass balance and its application in many food processes is explained in simple language. The examples worked out go a long way to understand the principles involved in mass balance.

The third chapter discusses the first law of thermodynamics, which is a quantitative expression of the principle of conservation of energy, has been dealt in simple mathematical language.

In the following chapter, the author deals with pressure-volume-temperature relationships, vapour-liquid equilibrium and heat transfer and has worked practical examples from food industry. Later he goes on to the properties of steam.

The chapter five is about combined mass and energy balance and its application to steady state or constant pressure batch processes, involving thermal energy effects, and gives the basic design calculations for evaporators.

Fluid handling, as the name itself implies, deals with the design features of different type of pumps, fans and compressors used in food industry in the sixth.

The next chapter on fluid flow gives an insight to the characteristics of fluids, nature of fluid flow, velocity distribution, mechanical energy balance, which assist in deciding upon the size and type of pipe used, the equipment design, design of pumps etc. for all applications in any industry dealing with fluids. It also deals with velocity measurement and an introduction to non-Newtonian fluids.

Heat transfer envelopes conduction, convection and radiation which have been well dealt in the following chapter. It gives the basic designs of plate heat exchangers and tubular heat exchanger.

The chapter on mixture of gases and vapours gives an insight to its behaviour in food processing, *Psychrometry* and its principles with their application in evaporative cooling, airconditioning, dehydration are dealt with in vivid detail.

The book also deals with the basic phenomenon of refrigeration, mass transfer as applied to problems in food processing and dehydration.

This book is a very valuable asset to all students, engineers and technologists connected with Food Industry in order to understand the engineering principles involved in food processing. It gives an insight to most of the machinery and equipment used in food industry.

C. N. NARASIMHAMURTHY

Food Engineering Systems: Volume 1—Operations, Edited by A. N. FARRALL,

AVI Publishing Co., Inc., Westport, Connecticut, 1976, U.S. \$ 21.00 (soft) 46.00 \$ (cloth).

Food Engineering System presents the application of engineering to many different divisions of food industry like food processing, meat processing, dairy industry and also certain basic processes like separation, drying, freezing, canning, packaging etc. Unlike the traditional unit operation approach, the system approach has been followed in the present book, so as to present a clear and vivid picture of the food industry as a whole.

The subject matter has been dealt under 25 chapters starting from physical and chemical properties of food, harvesting of fruits and vegetables etc. and ends with food packing, automation, sanitation, safety and health administration.

Each chapter has been provided with a bibliography on the relevant literature and also a set of questions on each subject for gauging the knowledge on the subject. At the end of the book is an appendix containing 50 tables containing information on food processing systems. A subject index has been provided at the end of the book.

The basic principles involved in each system, equipment used, relevant performance data and operating features are clearly presented for each system. Illustrative flow diagrams of various systems and useful performance data are presented by means of many tables. Unlike a textbook, practical features and trouble shooting of process equipment have been included at suitable places. All aspects of food processing systems from raw material handling to package has been given a little thought.

It is a useful book not only for students but also for plant operators. The book is a welcome addition to all technical libraries and also a useful manual for food plant engineers and operators.

P. K. RAMANATHAN

INDIAN FOOD PACKER

Elementary Food Science: by JOHN T. R. NICKERSON, Ph.D. and LOUIS J. RONSI-VALLI, M. S.

This is an excellent book which systematically deals with the aspects of Science, Food changes and Handling and Processing of foods.

In the first section of the book the idea about the nutrient requirements of the body is given. Sanitary handling of foods is very nicely discussed, i.e., how the personal hygiene and sanitation in the home should be maintained. Detection and removal of adulteration is briefly mentioned in the chapter of Regulatory Agencies. Food additives and their requirements are also written over here. There is a brief mention about food-borne diseases and their cautionary measures.

The chapter on 'Causes of Food changes' deals with microbial growth and its effect upon the growth of food. It also deals with the classification as well as other aspects of enzymatic reactions and also other chemical reactions like oxidation, the strecker degradation, the aggregation of proteins and their role in food changes.

The section third deals with the Processing of foods which is of special interest to Food Scientists. This is the important feature in food science. Different steps involved in the canning of various food products are written in very systematic manner. Methods for drying of foods and effect of drying on microorganism are also very clearly mentioned. This book also consists of techniques for refrigeration, different freezing methods and quality changes during frozen storage.

This book is very useful for manufacturers and consumers. Addition of different chemicals for the preservation of foods is very clearly illustrated. Importance of animal foods, dairy products, poultry, eggs and fishes in daily life is very clearly mentioned.

The book does not only deal with foods but it also deals with cereal grains like wheat, corn, oats, barley and other cereal grains like sorghum, Buckwheat, cottonseeds and millet. In addition to it the bakery products are also given; special emphasis has been given on the consumption of bread.

In the last chapter efforts are made to give the reader the chemistry backgrounds of vegetables and fruits.

The book is of descriptive nature. The reader with little chemistry knowledge can also make use of this book. It is an ideal book for students who are studying food science as one of the subjects in their courses.

The publication is very useful for food processing in Food Science and Technology and deserves a place among reference and text books.

GURDEEP KAUR

Extruder-Based Foods in India: Anand Workshop, published by Protein Foods and Nutrition Development Association of India, Bombay, January 1976, pp. 66.

The report is the proceedings of the workshop conducted at the National Dairy Development Board, Anand, Gujarat, by the Protein Foods and Nutrition Development Association of India, 22 Bhulabhai Desai Road, Bombay-400 026.

Chapter 1 outlines the Origin and Plan of the Workshop. The next chapter contains the opening remarks of Mr T. S. Nagarajan, Chairman of the Association; and address by Dr V. Kurien, Chairman, National Dairy Development Board, and the introduction to the Workshop by Mr R. B. Rao, Vice-Chairman of the Protein Foods and Nutrition Development Association of India.

Chapter 3 gives the background presentations of extruder technology by Dr K. T. Achaya, Executive Director of the Association; extrusion cooker for cereal protein

foods by Mr P. K. Ramanathan and Mr P. N. Srinivasa Rao, Central Food Technological Research Institute, Mysore. Mr Rajat Mitra spoke on the financial profile of extruder-based foods.

Chapter 4 discusses the Bareilly experience with extruded fruits; Mr B. P. N. Singh of G. B. Pant University of Agriculture and Technology and Biochemical Engineering, Jadavapur University, presents a paper on the experiences and possibilities and using a Brady crop cooker for manufacture of textured foods in India. Mr Kailash Vyas, Kaira District Co-operative Milk Producers' Union Ltd., Anand, discusses about the extruder designs; Mr Varadu Seshamani of Bangalore Tool Works describes the design and development of extruder in India. Mr K. Raghunandan, Total Engineering Consultants, Bangalore, speaks on Project profile on cooker extruder-based snack. The scope for extruded foods in India is discussed by Mr V. H. Shah of Kaira District Co-operative Milk Producers' Union Ltd., Anand.

Mr Laljeet Singh, Food Corporation of India, explains the FCI plans for extruded foods. Mr M. K. Panduranga Setty, Mysore Snack Foods Ltd., Bangalore, gives his observations on extruded foods.

In the 5th chapter, Mr P. V. Narayanan, Deputy Chairman, Indian Institute of Packaging, gives some considerations in the packaging of extruded foods in small and large packs. Mr S. J. Khodaiji, The Metal Box Co. of India, Bombay and Mr Harshad F. Shah, Poysha Industrial Co. Ltd., Bombay, discusses about packaging of extruder foods. Mr N. H. Vyas discusses bulk packaging. Mr K. N. Venkatasubramanian and Mr J. B. Jani, Indian Petrochemicals Corporation Limited, Jawaharnagar, speaks about polyolefin resins as raw materials in food product packaging.

The 6th chapter is on marketing of extruded foods. A number of eminent personalities take part in the discussion.

The question and answer session was led by Dr B. L. Amla, Director of CFTRI, Mysore, assisted by Mr P. K. Ramanathan, Dr D. V. S. K. Rao, Mr V. H. Shah, Mr B. P. N. Singh and Dr Ravi Talwar.

The chapter 8 gives the summing up by Mr T. S. Nagarajan, Chairman, Protein Foods and Nutrition Development Association of India. The 9th chapter ends with the list of participants.

It is an interesting and useful report. Copies of these report can be had from Food Technology Division, UNICEF, 11 Jorbagh, New Delhi-110 003.

Coconut palm products—Their processing in developing countries: by BRYAN E. GRIMWOOD, Tropical Products Institute, London, FAO Agricultural Development Paper No. 99, Rome, 1975.

This is another book on Coconut palm which is one of the world's major crop plants. The present book is mainly devoted to coconut processing. The book comprises fifteen sections and seven appendices. In section one, the origin and the possible mode of distribution of the coconut palm in the world, the varieties, their botanical features and requirements and utilisation are discussed. Section two deals with coconut characteristics, harvesting, storage and seasoning, transport, and methods of husking and shelling. Principles of copra drying are given in section three. The rates of drying using sun light, klin heating, forced hot air etc. are presented and their relative advantages discussed. In section four different copra drying processes followed in coconut growing countries are given in detail. Exhaustive account of methods starting from sun drying to more modern mechanical drying systems are presented. This is a very useful section for those who are engaged in copra producing industry. The conflagrational hazards in copra klin and stored copra and suggestions to avoid

them are discussed in section five. The system of copra grading in the international market is given in section six. Quality control aspects of copra, infestation by insects and fungi, and methods of their control are dealt with in section 7. In section eight utilisation of coconut husk like manufacture of coir, mats, rubberised coir, curled fibre, uses of coir fibre, production and trade are given in detail. Uses of coconut shell in the manufacture of activated carbon, coconut shell flour are discussed in section nine. Utilisation of coconut water which is a waste material in copra manufacture is given in section 10. The nutritional properties and medicinal uses of coconut water, its use as a growth medium for microorganisms and for the production of protein foods are briefly discussed in this section. Manufacture of desiccated coconut which has become an important product of commerce has been extensively discussed in section 11 along with keeping qualities, specifications and microbial contamination of desiccated coconut. Coconut food products like edible copra, coconut milk, syrup and coconut protein are given in section 12. Coconut palm sap products like toddy, vinegar, arrack and jaggery are given briefly in section 13. Section 14 is devoted mainly to the integrated processes for the manufacture of oil and protein from fresh coconut. Many wet processes are discussed along with their relative advantages and flow diagrams. This is a very useful section for those interested in the coconut processing industry and those who are engaged in related field of research. Problems encountered in the processing and utilisation of coconut palm wood are dealt with in section 15.

The appendices 1, 2 and 3 give statistics of world coconut production, world copra production, draft code of hygienic practice of desiccated coconut. Appendix 4 gives draft standard specifications for desiccated

coconut. Appendix five is concerned with the general specifications for desiccated coconut. Appendix six gives the coconut equivalents and percentages while appendix seven details the world-wide list of organisations connected with the development of the coconut industry.

On the whole the book includes a wide range of information connected with coconut products. This serves as a good reference book for those interested in technology, research and industry and trade in coconut palm products. It is a very useful book as the information available is up-to-date and will thus be a welcome addition to the existing books.

L. V. L. SASTRY

Report of the Sales-cum-Study Team to the Middle East: Kuwait, Saudi Arabia, United Arab Emirates and Bahrain, Processed Foods Export Promotion Council, New Delhi, pp. 114.

The Sales-cum-Study Team consisted of Shri N. Prakash, Midland Fruit and Vegetable Products Co. (India) Pvt. Ltd. and Shri P. S. Srinivasan, Secretary, Processed Foods Export Promotion Council, New Delhi.

Kuwait is a leading consumer market with the characteristics of the western sophistication where the consumer is discriminate in his buying decisions. The Team has collected a lot of data on fresh and processed fruits and vegetables, meat, (fresh, chilled and frozen), Biscuits, Wheat bran, Sugar Confectionery, Tomato products and Natural Honey. The appendix includes statistics on fruit and vegetable juices, frozen and dehydrated vegetables, fruit preserves and meat products. The recommendations and conclusion are very useful to the prospective exporter. It also gives names of parties interested in imports.

India's exports to Saudi Arabia are handicapped due to heavy congestion and long waiting period of the Saudi ports. Many importers avail facility of discharge of their cargo at Kuwait, Dubai and other ports and transport them by road. With the population of approximately 9 million the consumer is mostly conservative.

Jeddah is a commercial and diplomatic capital of Saudi Arabia and Mecca is the religious capital. Dahrhan is the centre of oil industry. Presently fruit juices and nectars are imported from Japan, Taiwan, Cuba and Egypt and there is a potential for Indian exporter. The report gives statistics of foodstuffs, juices, fruits and vegetables imported. Labelling on the food containers has assumed importance and general specification for canned fruits is given in the appendix. Separate appendix gives list of preservations for preparation of foodstuffs and list of parties contacted in Saudi Arabia.

United Arab Emirates (UAE) comprise of a number of Sheikdoms; of these Dubai and Abu Dhabi are the main ones. Dubai occupies a strategic position. The importance of Dubai is enhanced by high volume of transshipment activity due to availability of a number of country crafts. Dubai and Abu Dhabi offer a promising market both for live animals and meat (chilled and frozen), poultry products, biscuits, fruits—both fresh and canned including juices, vegetables fresh and canned, tomato products, pickles, confectionery, alcoholic beverages. Quite useful statistics of these products is given in the appendix including the list of parties dealing in foodstuffs.

Bahrain has an estimated population of about three lakhs. It offers potential for meat chilled and frozen), bakery products, bananas, fruit juices and syrups. Appendix gives the list of major importers in Bahrain.

Market Survey on Processed Fruits, Vegetables and Juices in Belgium—Luxembourg:

by Trade Development Authority, Bank of Baroda Building, 16 Parliament Street, New Delhi-110 001, pp. 117.

The report is based on Market Survey on Processed Fruits, Vegetables, and Juices conducted with the assistance of International Trade Centre (ITC) and Swedish International Development Agency (SIDA) during February-March 1976 by Shri D. K. Khanna, Trade Development Authority (TDA), assisted by Mr B. Ancel of ITC, Geneva.

The study tries to assess the export potential of Processed Fruits Vegetables and Juices; trends in consumer demand; local production; tariffs and distribution channels. The survey also points out the strategy to be adopted by Indian exporters and Government. The report is the result of both desk research and field investigation which included contacts with organisations, collection of data and discussion with the Belgium Office of Foreign Trade with the assistance of Indian Embassy at Brussels.

Import of canned vegetable increased 3 times in 1974 over the figure of 1970. Tomato accounts for one fourth followed by mushroom, potato, beans and asparagus. Processed fruit and juice increased by nearly 250 per cent during the same period. Some of the products which could be of interest to the Indian manufacturers and exporters are fruit cock-tail, fruit juice and mango slices. The 3rd chapter outlines the Economy and Foreign Trade and trade with India. The next chapter discusses the Market Characteristics, the canning industry in Belgium and their imports of Vegetables, Fruits and Juices and consumption pattern. A number of tables are given outlining the pattern of consumer expenditure, distribution channels, super markets, advertising and sales promotion expenditure and prices of some important items. The 5th chapter discusses access to the Market with regard to

tariff, value added tax, licensing requirements, documents, labelling requirements and Health Regulations. The 6th chapter gives the items of interest to the Indian exporter. The section of buyers profile is quite interesting and helpful. It gives the names of the important buyers, their interest and present sources of supply. The publication also gives useful annexure of trend of imports, unit value of important products, retail prices of processed fruits, vegetables and juices in cans and bottles, Preferential rate of duty under GSP, countries and territories enjoying GSP, countries under ACP group enjoying duty free etc. Annexure

5 outlines the EEC Council directive of 17 November 1975 including the minimum Juice/Pulp content and acid content in fruit nectars. The following annexure gives the labelling requirements according to the present law. There are also annexures giving list of journals, trade fairs, organisations and associations including list of members of association of producers and importers of canned fruit and fruit preserves, members of Belgium union of importers and import agents of Processed Fruits and Vegetables and an estimation of price and import demand.



VAF

OFFERS

MANGO PULP ★ LIME JUICE ★ CHIKU PULP ★ GREEN MANGO SLICES ★ GREEN MANGO PULP ★ GREEN CHILLIES ★ GOONDA IN VINEGAR AND VARIOUS OTHER PRODUCTS FOR YOUR INDUSTRY

CONTACT

VAF

C-2/19 Industrial Estate
GORWA, BARODA-3

NOTES and NEWS

-
- *Tabasco like Sauce from Indian Bird Chillies*
 - *Treating Waste Water*
 - *Excise Payment*
 - *Equal Wages Act*
 - *Poultry Farming*
 - *UN University at Mysore*
 - *Bihar: Industrial Development*
 - *Uttar Pradesh: Industrial Development*
 - *Tamil Nadu: The State Industries Promotion Corporation of Tamil Nadu (SIPCOT)*
 - *Rajasthan: Industrial Development*
-

Tabasco like Sauce from Indian Bird Chillies

In the prolific capsicum family the small and very hot varieties known as 'bird chilli' are ascribed to the species *Capsicum frutescens*. It is recognized as a perennial with flower clusters in leaf axils. The stems become woody and thick. The fruits are yellow to orange red in colour, 1.5 to 3 cm in length. Bird chilli is grown commercially in some African and Central American countries. Extracts of the dry fruit are used in pharmaceuticals.

Although bird chilli is not grown commercially in India, it is a common garden plant. A few growers in Andhra Pradesh and Tamil Nadu are marketing the fresh fruit at a premium price, for use in pickles and 'papads'.

A variety of bird chilli was introduced into the Louisiana area of United States from the State of Tabasco, Mexico. These hot red peppers came to be used in the manufacture of Tabasco sauce which is now

a famous and proprietary brand. It was marketed in 1868 in the United States and is now also made in Britain under licence.

Tabasco sauce is essentially a vinegar extract of exceedingly pungent thin red pepper and may contain, in addition, small amounts of salt, sugar, gum, colour and preservative to give the required taste, texture, appearance and shelf-life. Various recipes are available for chilli sauces.

We have made a chilli sauce from bird chillies grown in India and compared the product with an imported sample of Tabasco sauce. The results are very encouraging.

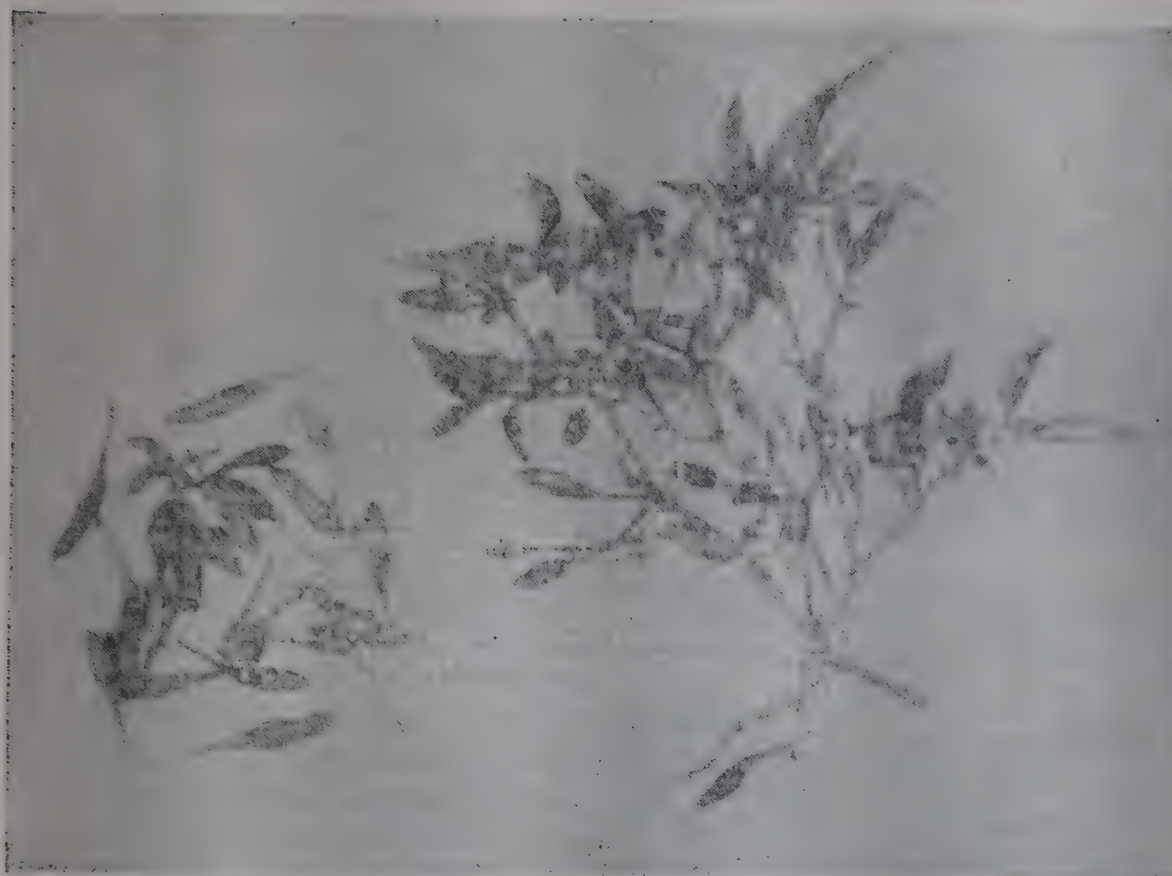
The small red chillies were obtained from Tamil Nadu and Andhra Pradesh. They are locally known as 'Kodical chillies' and 'Seema Mirupu' respectively. The fresh fruits were orange to orange red in colour. 'Seema Mirupu' plants have subsequently been successfully raised in our Institute gardens using seeds obtained from the first consignment from Andhra Pradesh.

Procedure

The freshly harvested chillies (600 g) were freed of stalks and washed. They were then put through a waring blender for a few minutes (2-3) using minimum amount of water (400 ml) and the mixture heated for 5 minutes at 80°C. It was then strained through a 7-mesh sieve to remove seeds and coarse pulp. To the strained extract 100 g of acetic acid, 20 g of salt and 500 mg of sodium benzoate were added and mixed thoroughly in the blender. Gum acacia (10 g) was dissolved in hot water, whipped up and then added to the mixture. The whole mixture was made upto one kilogram.

The final product had the following composition:

Acetic acid	10 %
Gum acacia	1 %



Fruiting branch and fruits of Seema Mirupu

Salt	2%
Chilli extract	87%
Preservative	500ppm
Total soluble solids	11 (refractometric)
Scoville heat value	was about 10,000 units.

In the Scoville method for determination of pungency or heat of capsicum products, an aliquot of a dilute solution of a known weight of the product in alcohol is further diluted with 5 per cent sugar solution to different levels. The level at which a 'bite' or stinging sensation in the throat is just perceptible on swallowing 5 ml of the solution determines the Scoville heat value of the product.

The product was compared with the imported sample of Tabasco sauce by organoleptic tests and found to compare with it very favourably. It is thus possible to prepare from Indian bird chillies a chilli

sauce very similar to the famous foreign brand.

REFERENCE

1. Scoville, W., *J. Am. Pharm. Assoc.* 1912, 1, 453.

CFTRI
Mysore

N. KRISHNAMURTHY
Y. S. LEWIS
S. SHIVASHANKAR AND
C. P. NATARAJAN

Treating Waste Water

The National Environmental Engineering Research Institute, Nagpur, has assessed the relative cost economics of waste treatment methods and prepared type designs for the population range of 5,000 to 2 lakhs. The Institute is of the opinion that sewage treatment and disposal need not be a burden to the community and it can pay for itself to a large extent. Sewage treatment yields irrigation water that contains all the essential nutrients (nitrogen, phosphorus and potassium) to make it a fertilizer. In addition,

fish farms can be developed using a well treated sewage effluent.

The Institute is engaged in R & D work in the field of environmental engineering. It has established suitability of three low-cost waste treatment methods for treatment of sewage and waste waters. They are: (i) waste stabilization ponds, (ii) aerated lagoons, and (iii) oxidation ditch. These methods cost less and yet are as efficient as the conventional methods of treatment requiring sophisticated equipment and skilled operation and are suited for tropical climatic conditions.

Waste waters, either of domestic or industrial origin, are stored in the pond for a few days. In the presence of sunlight and the organic nutrients in the wastes, a healthy bloom of algae flourish in the pond together with the bacteria. The bacteria speedily digest the organic wastes, providing nutrients for algal growth. In doing so, the wastes are stabilised and rendered harmless. This natural purification takes place without any foul smell and the mosquito nuisance if the pond is properly operated.

Depending upon the strength of domestic and industrial wastes mainly in terms of its biochemical oxygen demand (BOD), suspended solids and the quantity of wastes to be treated, the method of treatment can consist of either one or more stabilization ponds which can be operated either in series or in parallel for efficient performance.

In places where land is costly, the other alternative is to have deeper ponds. In the case of deeper ponds with a depth around 3 meters or more, it is necessary to provide mechanical aeration for treatment of the waste waters. Through this, more air is fed to the system to enhance the degradation of organic matter in waste water by the bacteria that are inherently present in the system.

Another process, Oxidation Ditch, consists of an oval shaped, well defined shallow

pond with a mechanical rotor for oxygen donation to the system. Here again, the waste water is fed to the system through an inlet and the system is seeded with activated sludge, which is a well built-up microbial mass. With the rotor section, it flashes the liquid in the form of bubbles into the air and the liquid is kept churning throughout, thereby bringing the waste waters in an intimate contact with the air as a source of oxygen. The waste water is thus treated well.

These methods are preferred to the conventional methods of treatment such as an activated sludge process or a trickling filter process. These cost much less without any compromise on the efficiency of treatment in terms of reduction in biochemical oxygen demand of the wastes. Further, even the treated effluents are not wasted and can be used for various purposes such as irrigation, fish culture and gardening. Since these low-cost waste treatment methods do not involve much equipment, except for a rotor and a motor, the operation and maintenance are much simpler and cheaper as compared to the conventional processes.

Excise Payment

Collection of excise and customs duty has been simplified. Assesseees all over the country will have the facility to pay excise in any branch of the State Bank of India and also in any branch of a national bank selected for this purpose for each collectorate of central excise from April 1, this year.

Other dues like customs duties and gold control fees collected by Central Excise collectorates can similarly be paid into branches of the State Bank of India or of a selected public sector bank in each collectorate. Customs duties, however, at major ports of Bombay, Calcutta, Madras, Cochin, Visakhapatnam, Kandla and Goa will be paid only in the customs house treasury. Assesseees and the public will not be required to go to

the treasury for the purpose of such payments.

This decision has been taken as a result of departmentalisation of revenue accounts informations under the central board of excise and customs.

To facilitate the work of public sector banks and of proper accounting of receipts, it has been decided that all types of payments will be made only under cover of a standardised chalan which will be separate and distinguishable for each major head of account. A list of such heads is printed on the reverse of chalan forms which can be collected by assessee from the nearest central excise range office.

Equal Wages Act

The provisions of the Equal Remuneration Act, 1976, have been extended to employment in the manufacture of food products according to a notification issued by the Union Ministry of Labour.

Another notification has also been issued for the constitution of one or more advisory committees to advise the appropriate governments about the extent to which women could be employed in these units.

The employment in the manufacture of food products covers: slaughtering, preparation and preservation of meat; manufacture of dairy products; canning and preservation of fruits and vegetables; canning, preserving and processing of fish; crustacean and similar foods; grain mill products; manufacture of bakery products; manufacture and refining of sugar other than indigenous sugar; production of indigenous sugar and palm juice; production of common salt; and manufacture of cocoa; chocolate and sugar confectionery, including sweetmeats.

It will also include manufacture of hydrogenated oils, such as vanaspathi ghee; manufacture of other edible oils and fats such as

mustard oil, groundnut oil or til oil; tea processing; coffee curing, roasting and grinding; cashewnut processing such as drying, shelling, roasting and salting of cashewnut; manufacture of ice; manufacture of prepared animal foods; manufacture of starch; and manufacture of any other food products.

So far, 14 employments have been covered under the Act. They are: plantations, local authorities, central and state governments, hospitals, nursing homes and dispensaries, banks, insurance companies and other financial institutions, education, teaching, training and research institutions, mines, Employees' Provident Fund Organisation, Coal Mines Provident Fund Organisation, the Food Corporation of India, the Central Warehousing Corporation and State Warehousing Corporation, manufacture of textiles and textile products, factories located in plantations, manufacture of electrical and electronic machinery apparatus and appliances, manufacture of chemical and chemical products except products of petroleum and coal, and land and water transport.

Poultry Farming

The Bank of India is financing the setting up of poultry units in Dumas village in Surat district by agricultural labourers and marginal farmers whose annual family income is less than Rs 2,000. These farmers are identified and recommended by Small Farmers' Development Agency, Surat and Surat District Poultry Farmers' Co-operative Society.

The Bank finances the setting up of about 300 poultry units to the extent of Rs 15 lakhs. The scheme is being implemented in three phases—covering 100 units in each phase. The Bank has so far financed 97 poultry units and disbursed Rs 4.85 lakhs. Each unit has been sanctioned Rs 5,000. The 97 units have progressed very well and the birds are well looked after.

The SFDA, Surat, has met the cost of providing 100 one-day old chickens and poultry feed for first five months at the rate of Rs 2,300 for each of these units. The persons who are managing these 97 units have been given training in poultry farming.

The Surat District Poultry Association has employed two experienced poultry supervisors to look after these poultry units, supplying poultry feed, collecting eggs daily for marketing and advising them on technical matters relating to poultry farming.

It is expected that each unit will make a net annual income of about Rs 3,500. On account of the success of the project, 'Community Aid Centre, Australia,' has given a gift of Rs 12,000 for laying a pipeline for supplying water from a neighbouring well in Dumas village. The Zilla Panchayat, Surat, has also sanctioned Rs 30,000 for construction of an approach road leading to the project site.

UN University at Mysore

The Central Food Technological Research Institute (CFTRI), Mysore, has been selected by the newly formed United Nations University established in Tokyo, Japan, to train scholars from developing countries in the advanced techniques of post-harvest conservation and processing of foodgrains.

The CFTRI is the only institution selected by the U.N. University to provide advanced training and to identify specific research priorities under World Hunger Programme.

The CFTRI will function as an Associated Institution of the University and will provide both multi-disciplinary and applied training in practical areas of post-harvest food conservation at appropriate levels through improved handling, storage and processing techniques.

The Director of the Institute will be overall in-charge of the supervision of the

programme and to its judicious implementation. The U.N. University will provide adequate support to the Institute in implementing these programmes.

The Centre has been started from November 1976 at CFTRI, Mysore, and has recommended ten scholars from different developing countries for training in post-harvest food conservation and processing.

Bihar: Industrial Development

Bihar has an area of 173,876 sq. metres with a population of 56.3 million according to 1971 figures. A wide range of industries including sugar, food and beverages are found in the State. Bihar offers a number of facilities and incentives to set up new units. There is a proposal for 49 industrial areas during the 5th Plan. 14 industrial estates are established and six are under construction.

Factory plots for industrial development are given for large and medium scale units on long term lease and the cost of acquisition and development of land is recoverable in 5 annual instalments. In industrially backward areas the cost is recovered in 10 equal annual instalments. For small scale industries the cost is subsidised by the Government to the extent of 25 per cent. In the case of industrially backward districts subsidy ranges upto 50 per cent. The cost is recoverable in 15 annual instalments. Industrial estates are made available to new small scale units at 50 per cent of the economic rent for a period of 5 years. Sheds may also be obtained on outright purchase or on a hire purchase basis. A rebate of 2 per cent in the interest is allowed for timely payment of instalment.

The Bihar State Industrial Development Corporation provides financial and other assistance. The Bihar State Small Industries Corporation assists in the development of small scale industries including cottage

industries and through supply of raw materials, marketing of finished products etc. The Bihar State Financial Corporation assists by way of long-term and mid-term loans. It has also special scheme for assisting technically qualified entrepreneurs and educated unemployed. BSFC grants loans up to Rs 3 million in case of companies and co-operative societies and upto 1.5 million in the case of others. The Bihar State Export Corporation assists in the procurement of imported raw materials for export production and in promoting exports. The Bihar State Credit and Investment Corporation assists in the identification, project preparation and assistance in obtaining finance.

Uttar Pradesh: Industrial Development

U.P. covers an area of 294, 413 sq. metres with a population of 93 million (1974 Census). Till recently, the organised sector of the State confined mostly to agro-based industries including sugar, edible oils and food products. In recent years, the Government have laid emphasis on the dispersal of industries and new programme for the development of entrepreneurship, modernisation, development of ancillary industries and industrial complexes. These have created a congenial and attractive industrial climate offering excellent facilities both for Agrobased and Engineering Industries.

The Government provides incentives and many facilities for setting up of industrial units. The State Directorate of Industries, the Pradeshia Industrial and Investment Corporation, State Industrial Development Corporation, Financial Corporation, Small Industries Corporation, U.P. Export Corporation, Regional Development Corporation for the development, of Eastern U.P. and Hill Districts have been formed to assist in the industrial development. Specific corporations like U.P. State Leather Development and Marketing Corporation,

State Brassware Corporation, State Textile Corporation, Handloom and Powerloom Finance and Development Corporation, Electronic Corporation and Handloom Corporation for providing assistance in specific fields have also been set up.

Pradeshia Industrial and Investment Corporation provides financial assistance to industrial projects which are not covered in the chapter of U.P. Finance Corporation. The corporation functions as an agent of the State Government for implementing schemes like credit guarantee and grant of interest free loan. The U.P. State Industrial Development Corporation assists the entrepreneurs by providing industrial plots at no profit no loss basis, arranges finance in the form of share capital through underwriting the public issue. The Financial Corporation arranges loans for the acquisition of bloc assets of new units, for renovation, expansion and modernisation on deferred payment guaranteed for indigenous machinery and finance to the hotels industry for attractive tourists.

U.P. Small Industries Corporation assists in providing machinery on hire-purchase basis; technical know how, marketing and making available of raw materials at competitive prices. It also helps to establish joint ventures in the Small Scale Sector. U.P. Export Corporation co-ordinate the activities of the exporters with various Export Promotion Councils in respect of incentives, including facilities of financial assistance against export documents. The Directorate of Industry has developed industrial estates and built up sheds, and offered on easy terms.

Electricity is made available at concessional rates. Industries in the backward districts with capital investment exceeding 2.5 million are exempt from electricity duty for 5 years. A Consultancy and Guidance Cell has been set up by the Directorate of

Industry for providing technical information and project reports. The Directorate of Industry provides loans for small scale units through U.P. Finance Corporation to Defence-oriented and agro based industry. The Financial Corporation grants loans to industrial concerns for land, building, plant and machinery at concessional rate of interest. Loans to medium scale industries by approved banks and financial institutions are guaranteed up to 0.7 million by Pradeshiya Industrial and Investment Corporation. The State Government allows 5 per cent price difference to small, medium and large scale industries. Raw material for the manufacture of nearly 40 items are exempt from sales tax and on other items concessional rate of sales tax is levied. All the new industrial units are exempt from the payment of octroi, toll or terminal tax on plant and machinery.

Tamil Nadu: SIPCOT

The State Industries Promotion Corporation of Tamil Nadu (SIPCOT) was set up in 1971 by the Tamil Nadu State Government as a limited company managed by a Board Director. The aim of SIPCOT is:

1. Development of potential growth centres and provision of developed land at reasonable cost, with all infrastructure facilities.
2. Implementation of incentives for benefit of new entrepreneurs.
3. Provision of ancillary services for the entrepreneurs.
4. Provision of finance on liberal terms for medium and major industries, under I.D.B.I. Refinance Scheme.
5. Provision of seed, capital assistance to new technocrat entrepreneurs under I.D.B.I. Seed Capital Scheme.

The first major Industrial Complex was set up at Ranipet, North Arcot District, on a 712 acres land priced at Rs 9,500 per acre

(Rs 2.35 per sq. m). The second Industrial Complex at Hosur, Dharmapuri District, covers an area of 1,200 acres. The price of developed plots is fixed at Rs 10,000 per acre (Rs 2.48 per sq. m). Another town near Chengalpattu is called Maraimalai Nagar situated on a 161 hectare. The price of each plot is Rs 20,000 per acre (Rs 4.96/sq. m).

For details please write to State Industries Promotion Corporation of Tamil Nadu Ltd., 'Meco House', 11-A/1 Anna Salai, Madras 600 002.

Rajasthan: Industrial Development

Rajasthan has an area of 3.42 lakh sq. km and according to the 1971 Census, the population was 25.77 million. Rajasthan has made tremendous progress in providing infrastructure facilities. In 1950, the installed capacity of generating power in Rajasthan was 13.27 MW and it increased to 785.5 MW by March 1976. There has also been a marked improvement in the means of communications.

The Rajasthan Government is also providing incentives for setting up new industrial units in the State through the State Directorate of Industries and others. The Rajasthan State Industrial and Mineral Development Corporation provides land and built-in sheds in the developed industrial areas; enters into capital participation/underwriting in suitable cases; provides facilities in respect of technical consultancy, feasibility studies and electronic testing and research.

The Rajasthan Financial Corporation provides loans on easy terms in backward areas and foreign exchange loans under IDA Credit. The Rajasthan Small Industries Corporation provides assistance in marketing and publicity of products of small scale industries, participates in trade fairs and exhibitions, provides export guidance, procures and supplies scarce and indigenous

and imported raw materials and construction materials. Six districts—Jodhpur, Alwar, Nagaur, Churu, Bhilwara and Udaipur have been declared as eligible for grant of subsidy under the Central Investment Subsidy Scheme.

The State Government has announced an interest-free loan scheme under which Central as well as State sales tax paid by the industries during the next five years is refundable as a long term loan. The Industries Department has developed 16 indus-

trial areas with 1,318 plots, at a cost of Rs 10.1 million upto March 1976. The Rajasthan State Industrial and Mineral Development Corporation has developed 50 industrial areas with a total acreage of 7,852.7. The Industries Department has set up 11 industrial estates with 535 sheds at a cost of Rs 11.3 million. The RIMDC has constructed 545 sheds in the developed industrial areas which are available to industrialists on lease/hire purchase basis.

FOR STAINLESS STEEL

STEAM JACKETED PANS; PULPERS; STRAIGHT LINE EXHAUST BOX; RETORTS; TUBE TYPE HEAT EXCHANGERS; MINCERS; SCREW TYPE JUICE EXTRACTORS; PEA HULLERS; ELECTRO-MAGNETIC VIBRATING GRADERS; BOTTLE WASHING AND FILLING MACHINES; FRUIT AND VEGETABLE WASHING; AUTOMATIC PICKLE FILLING; HYDRAULIC BASKET PRESS; BLANCHING AND LYE PEELING; POTATO WASHER CUM PEELER; SLICER; SHREDDER; JAM FILLER; COCONUT GRATING MACHINE; PINEAPPLE PUNCHERS; CORERS; EYE REMOVERS; KNIVES FOR FRUITS AND VEGETABLES; PULPER SIEVES; AND OTHER FOOD CANNING MACHINERY.

WRITE TO:

RAYLONS METAL WORKS

KONDIVITTA LANE, OFF ANDHERI-KURLA ROAD

ANDHERI, BOMBAY-59 (A.S.)

Grams: 'BLANCHING'

BOMBAY

Phone: { 575932—Andheri Office/Works
392312—Bombay Works
573543—Residence

Export News

- *I. Registration of Export Contracts*
 - *II. Registration of Export Contracts*
 - *Export Credit*
 - *Advances Against Export Incentives*
 - *Export Credit and Guarantee Corporation: Export Promotion*
 - *European Economic Community*
 - *Suez Surcharge*
 - *Shipping Corporation of India*
 - *Merchant Fleet*
 - *Karnataka Export Promotion Centre*
 - *Surcharge at Ports*
 - *Promotion of Exports by Shipping*
 - *Trade Concessions*
-

I. Registration of Export Contracts

The scheme for Registration of export contracts appearing in the Import Policy for Registered Exporters has been liberalised in the policy *ibid* for 1976-77. These liberalisations will be equally applicable to the scheme notified wide Government of India, Ministry of Commerce Notification No. 12 (18)/75-EAC dated the 30th June 1975, providing protection against the changes in the cash assistance rates made after the signing of the contract. The liberalisations are:

(a) The contracts, in question, should be got registered with authorised dealers in foreign exchange through whom the relevant documents are negotiated, within 45 days from the date of signing of the contract. If a contract has been registered with a particular bank but the documents are eventually negotiated through another bank as the letter of credit is opened through that bank by the foreign buyer, such registration of

the contract may be accepted if other requirements are fulfilled;

(b) Under the scheme, the exporters may also register with the banks their export contracts in respect of goods which are not covered or classified in the Registered Exporters Policy;

(c) The overall intention is that 're-negotiation' of contract price/value should not become an indirect method in the hand of the exporter to get higher unit f.o.b. price for the goods as covered by the original contract. If there is a change in the value of goods covered by a registered contract due to a specific provision in the contract itself to allow re-negotiation of price/value in order to cover specific contingencies, namely, (1) a rise in freight and insurance, (2) exchange rate/variation or (3) a change in the specifications of the product to be exported, the exporter may not, on that account, be held ineligible to the protection available in respect of the registered contract under the above scheme. This facility will be available only in those cases where there is no variation in the quantity of the goods as originally covered by the contract and the change in the price/value is duly registered with the bank concerned within 45 days of such change in continuation of the main contract already registered. Further, in such cases, the exporter should furnish certificate from a Cost Accountant, duly qualified from the Institute of Cost and Works Accountant, Calcutta, or from a Chartered Accountant, clearly certifying that re-negotiation was necessitated as a direct result of escalation in the rates of freight, insurance, or exchange rate/variation or due to change in the specification of the product to be exported at the instance of the buyer which could not be foreseen on the date of contract and which in point of

time occurred after the date of the contract. This certificate should be submitted to the bank and the concerned port licensing authority at the time of registration of the change in price/value of the contract. Along with this, the registered exporters are also required to submit (1) a letter or certificate from the insurance company and/or the Shipping Agent indicating the changes in the rates of insurance and freight and (2) a certificate from the concerned bank indicating the exchange rate variation, in support of re-negotiation of the price/value of the contract, on these accounts;

(d) In respect of public tender contracts of foreign governments and public utilities abroad where after submission of a tender and before its acceptance, the terms are further negotiated between the Indian exporter and the foreign buyer and the ultimate contract is based on the offer made by the Indian exporter in the course of such negotiation, the date of such offer may be taken as the crucial date for purposes of protection against the change(s) in the cash assistance rate provided a certified copy of the offer is sent by the exporter to the Chief Controller of Imports and Exports as laid down in sub-para 64(3) (d) in Section I, Part 'B' of the Import Trade Control Policy for Registered Exporters;

(e) In respect of contract entered into with a foreign government or foreign public utility for which there was no tender, the date of offer will be taken as the crucial date only if there is no upward price variation between the date of submission of the 'offer' and acceptance of the same and subject to other conditions laid down. In cases where there is an upward variation at the time of acceptance of the 'offer' only the latter date, i.e. the date of acceptance of the 'offer' will be taken as the crucial date;

(f) The provision available under the scheme in respect of public tender contracts of foreign governments and public utilities

will also apply in cases where the Indian exporter is a sub-contractor and the main contractor is a foreign party whose tender has been accepted, provided the name of the Indian exporter appears as a sub-contractor in the tender and in the main contract. In such cases, the sub-contractor may also register the contract standing in the name of the main contractor in accordance with the prescribed procedure;

(g) After registering the contract and making the necessary endorsement on the original and copies of the contract, the bank will forward one copy of the contract bearing endorsement of registration to the licensing authority within whose jurisdiction the exporter is situated within 30 days of the date of registration. The exporter shall also send intimation about the registration of the contract to the licensing authority concerned within 30 days of the date of registration; and

(h) For purposes of registration of contract under the scheme, a firm contract will also include a firm export order which gives all the required particulars as per provision contained at sub-para 78 (v) in Section I, Part 'E' of the Import Trade Control Policy for Registered Exporters. If there is a telegraphic/telex offer and acceptance giving all the required particulars, it may also be registered with the bank provided it is accompanied by post confirmatory copy'.

II. Registration of Export Contracts

Attention is invited to the provisions contained in sub-para 62(2), Part 'B', Section I of the Red Book (Vol. II) for 1976-77 which lays down as under:

'If there is a change in the value of goods covered by a registered contract due to a price escalation clause or a specific provision in the contract itself to allow re-negotiation of price/value in order to cover a rise in freight and insurance, exchange variation or a change in the specification of the

product to be exported, the exporter may not, on this account, be held ineligible to the benefits accruing in respect of the registered contract under these provisions. This facility will be available only in those cases where there is no variation in the quantity of the goods as originally covered by the contract and the change in the price/value is duly registered with the bank concerned within 45 days of such change in continuation of the main contract already registered.

2. In connection with the above provision, certain points have been raised which need to be clarified. These clarifications are:

(a) If the quantity as originally covered by the registered contract is subsequently reduced without any change in the unit value, the exporter will be eligible to the benefits of Registration in respect of the exporter upto such reduced quantity only if his claim is otherwise in order;

(b) If the quantity as originally covered by the registered contract is subsequently increased without any change in the unit value, the exporter will be eligible to the benefits of registration in respect of the exports upto the quantity originally registered and not on the additional quantity, if the claim is otherwise in order;

(c) The contract for the additional quantity referred to in (b) above can be separately registered in accordance with the prescribed procedure and the benefits of Registration will be available to such additional contract if the claim is otherwise in order;

(d) If there is a change in the value of the goods covered by a registered contract due to the factors enumerated in sub-para 62(2) reproduced above, and there is also an increase in the quantity of the goods as originally covered by the contract, the exporter will be eligible to the benefits of registration in terms of the said sub-para 62(2) only in respect of the exports upto the quantity originally registered and not on the

additional quantity, if the claim is otherwise in order. Such additional quantity can be registered as a separate contract as per rules and procedure as indicated in (c) above; and

(e) the provisions made in the said sub-para 62(2) are applicable to the contracts entered into during 1976-77.

3. This clarification issues with the concurrence of the Economic Affairs Department and Irrigated Finance and is applicable to cash assistance also (File No. 1/2(xii)/REP/76-EPC).

Export Credit

The Reserve Bank of India announced two measures on January 14—additional impounding of the time and demand liabilities of the banking system and a 10 per cent rise in the margins against bank advance—to ensure that the surge in the lendable resources of the banking system did not fuel the inflationary trends in the economy. The measures have been carefully tailored to meet the credit needs of high priority growth sectors including export sector.

The restraints on money supply ordered by the Reserve Bank require the banking system to deposit 10 per cent with its 10 per cent of the incremental demand and time deposits made between January 14, and April 1, 1977. The RBI has agreed to pay an interest of 5.5 per cent on deposits so impounded.

The RBI letter advises banks to step up margins on all types of advances against inventories (raw materials, goods in process, finished goods) and book debts by 10 percentage points with immediate effect in respect of all existing accounts. The step-up in the margin has been directed to be implemented that the overall margin does not exceed 60 per cent.

The following categories of advances will be exempt from the proposed step-up in margins.

1. Advances covered under selective credit control directive. Those advances against selective credit control commodities which are specifically exempt from the minimum margin requirements specified in directives will also be exempt from this advice.

2. Advances which are exempt from the application of the minimum lending rate of 12.5 per cent.

3. Export credit.

4. Advances to small scale industry covered by credit guarantee schemes.

5. Advances to sick units.

The RBI has also drawn attention of the bankers to the unsatisfactory implementation of the new lending practice of splitting the cash credit accommodation provided by banks into loan components and demand cash credit component. A more orderly implementation of this practice has been suggested to bankers to ensure better credit planning and disciplined utilisation of credit.

Advances against Export Incentives

The Reserve Bank of India has given clarifications regarding the eligibility of advances granted to exporters against export incentives receivable from the Government for interest subsidy under the Export Credit (Interest Subsidy) Scheme, 1968, and refinance from the RBI. The clarifications were sought by some of the scheduled commercial banks.

1. In terms of the Export Production Finance Guarantee Scheme of ECGC, advances in excess of the f.o.b. value of the exports may be granted at the pre-shipment stage to cover the full domestic cost. The advance so given in excess of the f.o.b. value has to be repaid out of export incentives receivable. Soon after the goods in question are shipped, the amount of the relative export bill will be credited to the account and any balance outstanding in the account

will have to be treated as a post-shipment advance against incentives receivable. In terms of paragraph 2 (iii) of the directive DBOD. No. ECG. BC. 41/C, 297p-75 dated May 27, 1975, advances against export incentives are eligible for the concessional ceiling rate of interest of 11.5 per cent per annum upto a maximum period of 90 days at the pre-shipment stage (on the amount in excess of f.o.b. value) and at the post-shipment stage (on the balance outstanding in the account after shipment). The eligibility for concessional rate of interest and interest subsidy is restricted to the extent the relative claims are actually admitted and received from the concerned authorities.

2. Advances at the pre-shipment stage are considered eligible for refinance from the RBI under section 17 (3A) of the RBI Act, 1934, upto 180 days, or such extended period as the RBI may specifically allow for this purpose.

3. Where post-shipment advances against provisional entitlements for duty draw-back as certified by the Customs authorities are granted under the Duty Draw-Back Credit Scheme, they may be used for adjusting any pre-shipment advances granted in excess of f.o.b. value. The advances under the Duty Draw-Back Credit Scheme are interest free up to 90 days to the exporters and eligible for interest free refinanced from the RBI up to 90 days under Section 17 (3B) of the RBI Act, as stipulated in the Scheme. Such advances are not eligible for subsidy under the Export Credit (Interest Subsidy) Scheme. Any other post-shipment advances granted against cash incentives or duty draw-back will be eligible for the concessional rate of interest not exceeding 11.5 per cent per annum and interest subsidy of 1.5 per cent per annum upto 90 days, provided the terms and conditions of the schemes are satisfied.

4. Any post-shipment advances against incentives are not eligible for refinance from

the RBI under Section 17 (3A) of the RBI Act, which provides for granting advances at post-shipment stage only against eligible export bills.

Export Credit and Guarantee Corporation: Export Promotion

The Export Credit and Guarantee Corporation (ECGC) suggests that the Corporation is engaged both in extending credit facilities as well as covering credit risks by means of insurance cover. The Charter of the Corporation enables it to undertake lending operations. The guarantee and credit risks insurance policies issued by the ECGC enable the exporting community to obtain credit facilities from their bankers and the bankers can extend credit facilities to exporters without fear of the greater risks involved in export financing.

Adequate and timely finance is essential to any commercial and industrial activity. This is particularly so in respect of trading and manufacturing activity connected with export, as normal value of exports is large and timely delivery is vital for being competitive in the international markets. In a developing country such as ours where the total savings available in the community is not adequate to support the increasing economic activity and where there are several demands on the limited supply of credit, a special effort is necessary to ensure that the vital sector of export gets adequate credit facility. The ECGC fulfils this important role.

Banks and other financial institutions normally cover themselves against the risk of pre-shipment and post-shipment finance extended to exporters. The exporters too cover themselves against post-shipment risks as well as risks arising out of the cancellation of export orders, especially of merchandise built to special specifications,

after some investment has gone into the manufacturing of the merchandise.

The packing credit guarantee policy issued by the ECGC covers the commercial banks against the risk of non-payment of the credit facilities extended by them to exporters for purchase, processing, packing and shipment of merchandise, arising out of adverse business conditions beyond the control of the borrower. This enables the bankers to extend and the exporters to obtain need-based credit facilities relaxing the normal banking norms followed for credit facilities in internal trade. The ECGC policy covers 66-2/3 per cent of bank's risks.

With the increasing number of exporters scattered throughout the country, majority of the banks have found it advantageous to obtain the cover of packing credit guarantee policy for all their pre-shipment credit facilities. For this purpose, the ECGC offers a whole turnover policy covering all the pre-shipment advances of a particular bank at a very concessional rate of interest and with a highly simplified system of reporting. Under the whole turnover policy, risk coverage is upto 75 per cent.

Post-shipment guarantee policy is extended to commercial banks against risks involved in their purchasing or discounting bills covering exports. The exporters are, in all such cases, covered by a separate policy of the ECGC for political risks abroad and risks of non-payment by the buyer. Besides, in the event of a bill financed by a bank being returned unpaid, due to risks not covered by the ECGC policy issued to the exporter, and the exporter not being able to repay the advance against such a bill, the bank is held covered by the post-shipment guarantee policy.

As for the coverage of post-shipment risks of the exporters, the ECGC offers insurance against political risks arising in the buyer's country as well as non-payment of a bill that has fallen due as also the insol-

vency of the buyer. In addition to obtaining an open policy for an agreed value, the exporter is required to obtain specific limits on individual foreign buyers, upto which risk is held covered. These limits are fixed after careful enquiry into the financial status and stability of the buyers.

With technological advancement in India and expanding industrial base, India is increasingly entering into exports of capital goods, turnkey projects and construction contracts. Exporters are required to give bid bonds, performance guarantees, bank guarantees for advance payments which they may receive from the buyers to enable them to commence the manufacturing/fabricating activity guarantees for raising local finance in the country where turnkey job or construction contract is undertaken etc. International practice is that such bonds and guarantees have to be given by banks.

The exporters of capital goods, turnkey projects and construction contracts, payment for which is usually over an extended period, obviously run a greater degree of risk than in short term exports, payment for which is normally received within a period of 180 days. The ECGC offers separate types of policies to such exporters covering political and commercial risks.

India is now in a position to export consultancy services. Payments for such services are also over an extended period. Consistent with the objectives of the ECGC the Corporation has devised a policy covering risks inherent in export of consultancy services also. The total value of exports financed against policies issued by the ECGC during the year 1975 was Rs 21,208.3 million. Of these, guarantee policies issued to banks for extending packing credit or performance guarantees amounted to Rs 17,063.6 million. The remaining Rs 4,144.7 million represent post-shipment credit risks insurance policies.

European Economic Community

Discussion on Generalised Tariff Preference Scheme (GSP) were held between the Commission of the Economic Community and 9 member states to be adopted for 1977. The purpose for GSP is to help developing countries increase the export earning and promote industrialisation by providing reduced duty or duty free for a wide range of products.

In order to qualify for preferential duty the GSP beneficial countries are to satisfy certain conditions as to the origin of goods. There are preferential duties for a wide range of agricultural, processed goods. The preferential duty is not subject to tariff quota or ceiling limits except for certain variety of tobacco, coffee, cocoa, and preserved pineapples. Duty free imports on products not subject to Tariff quota are limited by ceiling based on the developing countries past trade with the community.

Suez Surcharge

The Far Eastern Freight Conference, which provides services between Japan, Hong Kong, Thailand, Malaysia, Singapore, Indonesia and Philippines and the countries of Europe, reduced the Suez surcharge from 4.75 per cent to 2 per cent with effect from 1st April 1977. The Conference states that the effects of rescheduling on the Suez surcharge have been examined by independent accountants and their report shows that the average cost of transiting the Suez Canal compared with 1967 has increased by 2.04 per cent more than freight rates in the intervening period and this justified retention of a portion of the Suez surcharge.

The Conference has proposed a general increase in freight rates of 13.75 per cent with effect from 1st July 1977.

Shipping Corporation of India

Shipping Corporation of India has started direct cargo service between Bombay

and Mogadiscio (Somalia) with four sailings a year. Though the service has been in operation since April 1976, the S.C.I. has complained that the response from trade has not been encouraging.

Merchant Fleet

India will be adding 38 ships both bulk carriers and tankers to its merchant fleet in the next two years. Fourteen of the new ships are to be acquired from Indian shipyards.

Orders for the remaining 24 ships have been placed with Japan, GDR, Yugoslavia and Sweden. Many of these ships will be the latest in design and technology.

The Government has made available Rs 500 crores from foreign exchange reserves as loans to shipping firms to acquire ships from abroad.

The major Indian companies which will be acquiring the new vessels are the Shipping Corporation of India, Scindia Steam Navigation Company and the South India Shipping Corporation.

With the addition of new capacity, Indian ships will be carrying over 50 per cent of the general cargo and 100 per cent of the import of crude.

The Irano-Hind Shipping Company, a joint venture between the Shipping Corporation of India and Arya National Shipping Lines of Iran, has plans to raise its shipping tonnage to 51 lakh dwt. by 1980.

Karnataka Export Promotion Centre

The Karnataka Export Promotion Centre, 5 Chikkanna Cottages, Race Course Road, Bangalore-560 009, has been formed to assist new and regular exporters. In association with the Indian Industrial Trade Centre, the Centre will provide guidance to the manufacturers, trading organisations, exporters, importers and others interested in

international business. Members will receive a monthly export bulletin covering the commercial information, trade enquiries, and a copy of export guide. The annual membership is Rs 250 (ordinary) and Rs 1,000 (special).

Surcharge at Ports

The conference lines covering the trade from India, Pakistan and Bangladesh to the U.K. have announced an increase in the port congestion surcharge varying from five to 10 per cent.

Also the India-Pakistan-Bangladesh-Middle East Conference has announced a congestion surcharge of 21 per cent on all shipments by its vessels passing through Istanbul. This has been done in view of the serious berthing delay at the said port.

The Calcutta-East Coast of India and Bangladesh-U.S. Conference has announced a downward revision in the bunker fuel surcharge. As against the earlier rate of \$27.70 per tonne, the revised rate would be \$ 25.93 per tonne.

The India-Pakistan-Bangladesh-U.K.—Continental Conference has increased the surcharge in respect of west-bound cargo from 10 per cent to 15 per cent.

The above Conference has also conceded the long-standing demand of the shippers for the merger of the Suez surcharge with the basic freight. The earlier seven per cent Suez surcharge has now been merged with the basic rates, which have been revised upward.

The Conference has also announced that as a result of 12.5 per cent increase in the general rate, the bunker surcharge as a proportion of the freight revenue will be reduced from the existing level of 13 per cent to 11.64 per cent.

Promotion of Exports by Shipping

The Ministry of Commerce has set up a Standing Committee for Promotion of

Exports to consider various shipping and port problems. The Standing Committee consists of the following:

1. Shri P. K. Kaul, Additional Secretary, Ministry of Commerce.
2. Jt. Secretary, Min. of Shipping and Transport.
3. Member Customs (CBEC) or his representative.
4. Director, General Shipping or his representative.
5. State Trading Corporation of India Ltd., or its representative.
6. Shipping Corporation of India.
7. Scindia Steam Navigation Company.
8. India Steamship Company.
9. All India Shippers' Council.
10. Tea Board.
11. Jute Commissioner or his representative.
12. Chairman, Madras Port Trust or his representative.
13. Chairman, Calcutta Port Trust or his representative.
14. Chairman, Bombay Port Trust or his representative.
15. Federation of Indian Exporters' Organisation.
16. Federation of Custom House Agents' Associations in India.
17. Indian Institute of Foreign Trade.
18. Chairman, Cochin Port Trust or his representative.
19. Federation of Indian Chamber of Commerce and Industry.
20. Engineering Export Promotion Council.
21. Federation of Freight Brokers' Association of India, Calcutta.
22. Dy Secretary/Director (Transport Division).

The Standing Committee will examine and recommend measures for adequate and regular shipping services including promotional services, shipping space for liner export cargoes particularly low freighted

items; fixation of competitive and non-discriminatory freight rates and the reasonableness of surcharges levied on Country's exports; facilities in major and minor port in respect of warehousing, handling, etc.; simplification of documents, custom and other procedures; introduction and expansion of technological innovations like containerisation, palletisation, lighter vessels to facilitate carriage of export cargo.

Trade Concessions

Australia, countries of the European Economic Community, Finland, Norway, Sweden, New Zealand and Switzerland have given trade concessions on tropical products to developing countries. These concessions have come into force from January 1977.

It is expected that Austria, Canada and Japan will also come forward with similar concessions and contributions as soon as necessary domestic procedures have been completed.

These concessions are the first concrete out-come of the Tokyo Round Multilateral Trade Negotiations held in General Agreement on Tariffs and Trade (GATT) and are taking effect before the negotiations have been completed. Many of them concern primary products but, in a number of instances, they cover semi-processed and processed products also. Many developing countries derive a major part of their earnings from exports of tropical products like coffee, tea, cocoa, spices and a variety of goods in raw, processed or semi-processed forms.

The Tokyo Declaration, which launched this latest round of trade-liberalising negotiations at a ministerial meeting in September 1973, singled out tropical products for special and priority treatment. Some 44 developing countries submitted requests to 11 developed nations for tariff and non-tariff concessions covering about 299 tariff

headings and a number of tariff items under each heading. Following consultations in the Group for tropical products, it was agreed that countries should work towards the implementation of their concessions or con-

tributions on tropical products from January 1, 1977 or as soon as possible so that developing countries can start benefiting from then before the Tokyo Round negotiations are completed as a whole.

Foreign News

- **U.K.—Monobottler**
Morgan Fairest and Albro Fillers
Gravi Weight Filling Machine
Bancroft 6-head Flor-matic
Hotelympia 1978
10th International Exhibition-Olympia
 - **U.S.A.—AFL-CIO Food and Beverage Trade**
The Food Processing Machinery and
Supplies Association
 - **Australia—Ready Mix for Donut Production**
Equipment for Catering Industry
Frozen Meals for Homes or Caterers
Meat Products in Bulk of Consumer
Quantities
Asian Trade Fair
 - **West Germany—Anuga-1977**
 - **Rome—FAO Programme**
 - **UNIDO—Tenth Anniversary**
Pesticides for Better Crop
 - **Netherlands—Investment and Industrial Corpora-**
tion
 - **Yugoslavia—UNIDO Meeting**
 - **Kuwait—Fresh Vegetables**
 - **Thailand—Preferential Terms for Agro Inputs**
 - **Nepal—Road Project**
-

U.K.

Monobottler

The *Monobottler* built as a single unit by Morgan Fairest Limited, Fairway Works, Carlisle Street, Sheffield S4 7LP, England, performs the processes of three individual machines in one cohesive, totally synchronised, conveyerless operation.

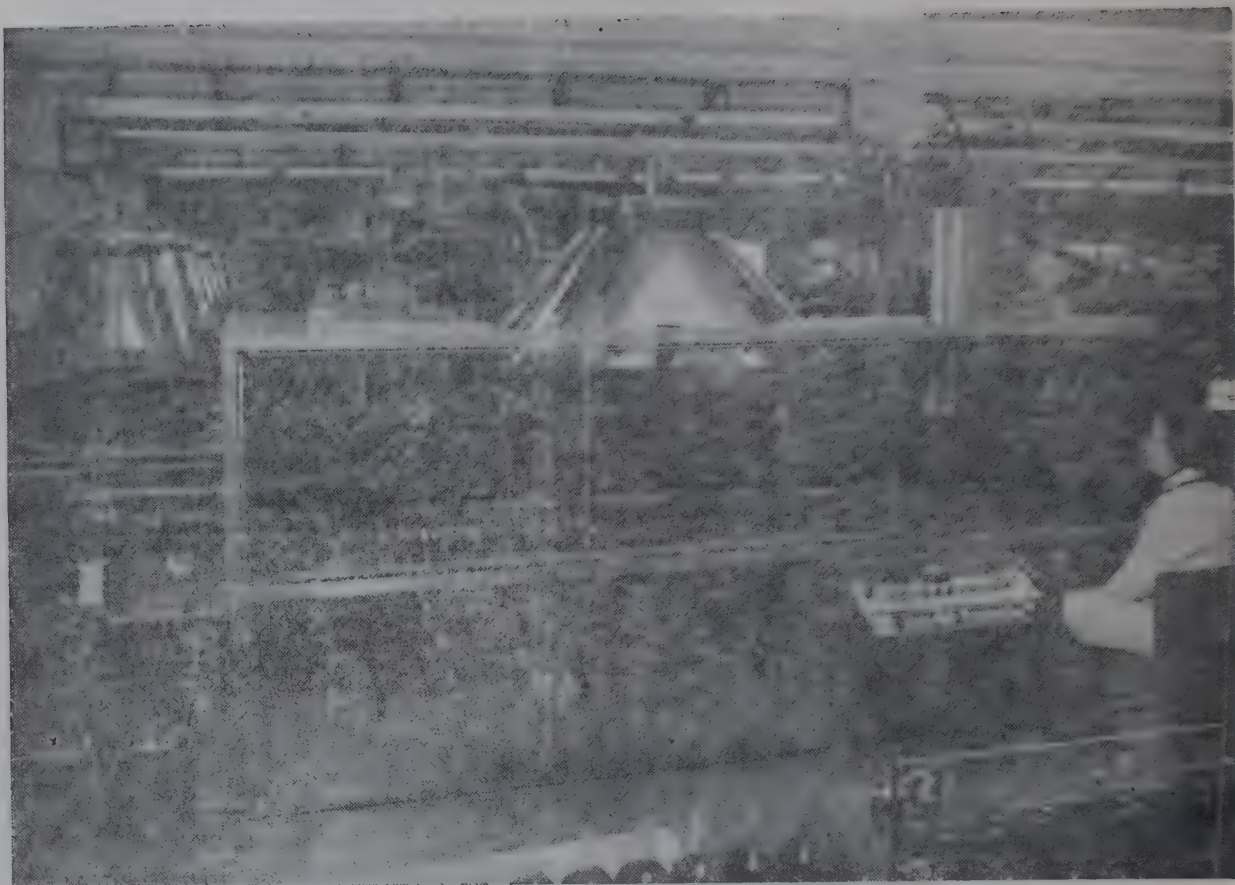
The constant level of bottle control in itself is something new. With the complete absence of conveyors, bottle to bottle contact is removed and the consequent reduction in noise level represents a great step forward in improving bottling hall work

conditions and makes compliance with the latest safety regulations much easier. Similarly, the compactly designed unit solves traditional safety problems with the tunnelled guard to infeed and outfeed and the guards to all working components shaped from polycarbonate sheeting.

Cleaning, filling and capping are synchronised in one unit at speeds up to 250 bottles per minute. A series II *Monobottler* is currently operating in a distillery line. The potential is flexible, since with their extensive range of *Morgan Fairest* and *Albro* machines various combinations of cleaner to filler and capper can be matched to product and line requirements. The *Monobottler* is designed to accept a wide range of capping turrets, both U.K. and foreign. Considerable improvement has been achieved in changeover time as against the three machine comparison, whilst centralised lubrication and designed use of components common to existing machine ranges have standardised all servicing and maintenance. The machine readily installs into, improves and condenses any existing line. Extensive factory test programmes ensured the *Monobottler* was presented with an uncommon level of reliability and it has enjoyed the unusual occurrence of no teething troubles whilst in actual commercial use. Overall the machine is stainless clad and designed to transport conveniently in separate sections.

Morgan Fairest and Albro Fillers

Morgan Fairest and Albro Fillers have produced a range of bottle cleaning, filling, capping and labelling equipment suitable for all kinds of liquids, pastes and powders and a variety of different containers. *Monobottler II* is a new concept in bottle handling. A fully synchronised unit, the Mono-



Set against the background of existing Albro filling machines the MORGAN FAIREST/ALBRO MONOBOTTLER efficiently and cohesively covers the same operations with considerable economy of line space

bottler will air clean, fill and cap a wide range of containers at speeds up to 240 per minute. It has many advantages over free-standing units, reducing labour costs and saving space.

The MF 1200 labelling machine is a straight through in-line unit designed to apply an allround overlapped label to round containers from 2" to 4" diameter. This machine applies the label whilst in the vertical position and employs both hot melt and cold glue systems which are quickly and easily cleaned, resulting in trouble free operation on containers both glass and plastic.

The MF 400 straight through, single body labelling machine is suitable for applying patch labels to round containers at speeds of 400 per minute. A version for applying labels to flat containers can be supplied to operate at a reduced speed.

The MFN 300 labelling machine is capable of applying one body label and one neck/shoulder label at a continuous running speed of 300 per minute. Both body and neck labels are simultaneously withdrawn from a stationery label magazine by the patented MF pickout system and mechanically transferred to the bottle without vacuum. An allover or patterned glue area can be applied to suit the application and the machine has the facility for providing a back label also, if required.

The MF 100 is a simple machine for body labelling round or flat containers at a speed of 100 bottles per minute. Allround overlap labels up to 12" long can also be applied. Designed for operation in the smaller company, attention has been given to reducing maintenance and the need for lubrication has been eliminated.

The sanitair range of air cleaning machi-

nes are well proven and widely used throughout the bottling industry. The Albro Iso Vacuum machine fills liquids by a system based on the gravity vacuum principle. The unit will have 30 filling heads and is mounted on the Company's 'D' base. Because a very low vacuum is used, the filling process is extremely gentle and the machine will handle almost any type of containers, including low-density plastics. All parts of the filling section through which the product passes are constructed of stainless steel and special attention has been given to ease of cleaning.

The Vacuum-Operated Volumetric filler is designed to fill exact quantities of still free-flowing liquids into glass, plastic and metal containers. Accuracies of within 0.5 per cent can be achieved.

Representing Albro's range of fillers

available for the packaging of most kinds of powders into glass, plastic, metal and board containers, will be a single head semi-automatic machine. Albro powder fillers are suitable for the filling of all types of powders, including instant coffee, milk powder, and chemical and cosmetic powders.

The contact parts of the Gravity Weight Operated filling machine is constructed entirely of stainless steel. This machine will fill free-flowing liquids into almost any shape of metal, plastic or board containers including bag-in-box containers, ranging in capacity from 4 oz. (0.1 kg) to 100 lbs. (45 kg).

Gravi Weight Filling Machine

The *Morgan Fairest Albro Works*, England, have installed an *Albro Gravity Weight Filling Machine* to operate within specific



ALBRO Gravity Weight Filler

requirements and conditions at *Addressograph Multigraph, Hemel Hempstead, England.*

The machine, of bench type design mounted on a mobile base, is situated in flameproof area and is pump supplied direct from the bulk storage tank. Constant level is maintained in the machine tank and an overflow system automatically returns the product from the machine to the main storage immediately the machine is stopped.

Bancroft 6-Head Flo-matic

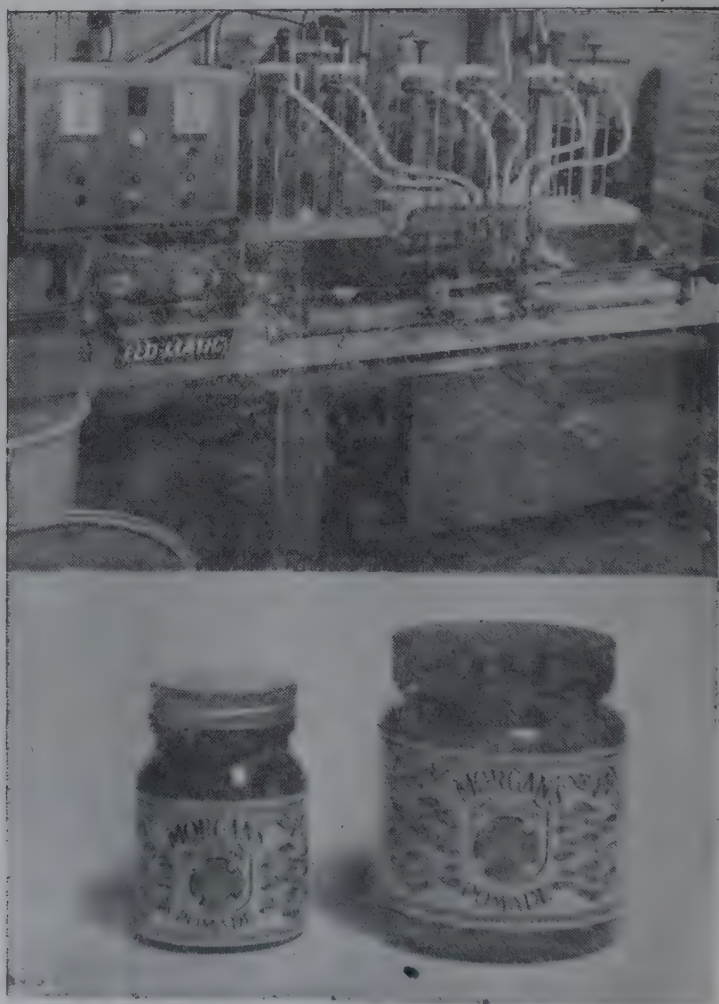
Purdy Machinery Co. Ltd., Ashford, Kent, have installed a Bancroft 6-head Flo-matic filling machine at the Whitstable Factory of Morgan's Pomade Company Ltd.

Since its installation the filler has successfully increased production by 150 per cent.

The Flo-matic displaces the semi-liquid Pomade automatically into 6 × 50 gram jars at one fill at a speed of 96 containers per minute. The machine doses to a high degree of accuracy (± 0.25). A simple adjustment enables the Flo-matic to fill a 200 gram jar. The Bancroft Flo-matic is just one of the range of fillers manufactured by Purdy Machinery Co. Ltd., for liquid and semi-liquid products.

Hotelympia 1978

The International Hotel-Catering Exhibition Olympia will be held in London from 25th January to 1st February 1978.



Top: Purdy Bancroft 6-head Flo-matic Filling Machine at Morgan's Pomade Co. Ltd.
Below: 50 and 200 gram jars of Morgan's Pomade Co. Ltd., filled by the
Purdy Bancroft 6-head Flo-matic

The exhibition is of major importance to hotels, restaurants, pubs, clubs, canteens, fast food vending, and subsidised services. The exhibition will exhibit widest possible spectrum of catering products and services. This will also cover beers, wines, spirits, labour-saving aids and system, kitchen equipment and utensils, hotel/restaurant fittings, accessories, business aids, hotel ward, cutlery and disposables, vending, contract services and leisure facilities.

More details be had from

Roger C. Moyle, Industrial and Trade Fair Ltd., Radcliffe House, Solihull, West Midlands B91 2BG, England.

10th International Exhibition-Olympia

The 10th International Exhibition for the Food and Allied Industries will be held at Olympia on 15-18 November 1977. This is a biennial development in processing and packaging. The Exhibition covers all aspects of food manufacture, handling and distribution, including canned, frozen, chilled and dried foods, bakery goods and confectionery, meat, poultry, milk products, soft drinks and fresh foods.

Conferences will be organised in conjunction with the exhibition. The subject matter is chosen in consultation with the food industry and its suppliers. Sessions are arranged daily to cover different aspects of food manufacture.

Accommodation booking facilities for BPS Exhibitions are provided for individual business travel and group travel, by Barry Martin Travel Ltd., Suite 309-310, Albany House, 324 Regent Street, London W1R 5AA, Tel: 01-637 0373, Telex: 24815. Visits are arranged to up-to-date British food factories, for approved overseas groups.

BPS Exhibitions specialise in industrial exhibitions. International events include those for the food industry, the paper and board industry, the pharmaceutical, cosme-

tics and toiletries industry, and the offshore industry.

The marketing needs of each exhibitor are individually related to the exhibition programme. Each event is run in conjunction with an Advisory Council. Further information may be obtained from:

BPS Exhibitions Ltd., 4 Seaford Court, 220-222 Great Portland Street, London W1N 5HH. Tel: 01-388 2117, Telex: 21237. Cables: Beepex London.

U.S.A.

AFL-CIO Food and Beverage Trade

Twelve unions joined in reactivating the AFL-CIO Food and Beverage Trades Dept. and agreed to co-operate on common legislative goals, organizing efforts and to resolve jurisdictional problems.

James T. Housewright, president of the Retail Clerks, was elected president of the department at an organizational meeting held at the AFL-CIO headquarters. President, Daniel E. Conway, of the Bakery and Confectionery Workers was chosen secretary-treasurer.

AFL-CIO President, George Meany, welcomed the revival of a department that had been dormant for more than 10 years and promised the federation's full support.

The department starts off with unions representing an estimated 2 million workers in the food and beverage industry. Member unions, in addition to the Retail Clerks and Bakery and Confectionery Workers, are the Meat Cutters, Hotel and Restaurant Employees, Distillery Workers, Grain Millers, Laundry Workers, Service Employees, Operating Engineers, Plumbers, Seafarers and the Retail, Wholesale and Dept. Stores Union.

Some affiliates have all or most of their members employed in the food or beverage fields. Others have only a part of their membership in the department's area.

The department's executive board, composed of one member from each affiliate, appointed Edward Panarello of the AFL-CIO COPE staff as legislative director. He was formerly a legislative representative of the Retail Clerks. An executive director for the department will be appointed later.

Operations will be financed by contributions from affiliates of one cent per member per month, for all members employed in the industry.

A major legislative goal for the department will be to strengthen the Fair Labor Standards Act, raising the minimum wage and doing away with exemptions on coverage.

The department will hold its first regular convention in December 1977 in Los Angeles.

The Food Processing Machinery and Supplies Association

The Food Processing Machinery and Supplies Association (FPM&SA) moved its offices from a suburban Washington location to Suite 700, 1828 L Street, N.W., Washington, D.C. 20036; (202) 833-5770. Located within six blocks of the White House, the new 3,200 sq. ft. office is within the hub of Federal agencies and allied industry trade association offices.

FPM and SA sponsors the largest annual trade shows in the Food Processing Industry. It also provides foreign marketing information for its members and conducts industry education programmes for food processors and their suppliers.

The 1978 International Exposition for Food Processors (IEFP) will be held in February 12-15, in Chicago's McCormick Place. Details are available from FPM and SA.

AUSTRALIA

Ready Mix for Donut Production

'Golden Boy' donut mix is made and exported by White Wings Limited, Food

Services Division, The Crescent, Kingsgrove, New South Wales, Australia 2208.

Great control over blending is enabling the Australian food company to produce a donut mix that has been used successfully in South-East Asia and is due to be used for donut production in Hawaii.

The mix was used recently by American Donut Company of Jakarta when it sold 25,000 donuts at the Jakarta Fair and was re-ordered for fairs at Medant and Semarang.

The mix used by the Jakarta company was in an automated production system comprising a cutter, fryer, accumulating conveyor, glazer and cooling conveyor devised by White Wings Ltd.

The supplier says that the advantages of such a system with a pre-mix include the ability to start production promptly each day and to operate at full capacity with product uniformity and elimination of tedious, repetitive work.

As well as supplying the mix for donuts, the company supplies cinnamon sugarcote, icing and small bags.

It can supply such equipment as small fryers with a hand-operated donut dispenser for small operators and a fully-automatic donut 'robot' for medium sized operators.

Icing bain marie and pancake dispensers are also available. The company is a major supplier of quality food for the catering and manufacturing industries with pre-mix products including cakes and desserts, soup powders, flavour boosters and fruit drink concentrates.

Equipment for Catering Industry

Heavy duty stainless steel commercial cooking equipment made by Waldorf Appliances Pty. Ltd., Sarton Road, Clayton, Victoria, Australia 3168, is suitable for institutions, hospitals, restaurants, hotels, motels and the catering industry.

Equipment includes ovens, grill plates,

ranges, boiling tables, deep fryers, stock pots, atmospheric steamers, rice boilers, baine marie, hot presses and salamander griller-toasters.

All are custom-built to order. An example is the Hotplate Modular Principle, incorporating open burners, solid grilling sections and solid boiling sections in 280 mm (11 in.) modules.

All units are adaptable to individual requirements. Standard front to back dimensions of all units allow equipment to be added as business grows.

All units are built on rust-proofed, jig-welded mild steel frame and external finish is 302 18/8 satin stainless steel, ensuring a robust product.

Frozen Meals for Homes or Caterers

Quick-Frozen 'Convenience' meals made by Wattie Pict Ltd., Forster Road, Notting Hill, Victoria, Australia 3168, are packaged to suit homes, hospitals, canteens and cafeterias.

All products are under the brand name 'Wattie's' and are in hygienic foil trays sealed in attractively printed polythene bags with directions for storing, heating and serving.

The products should be stored in a freezer at minus 18 deg C (0 deg F) and may be ovenheated without thawing.

The contents are illustrated in full colour on the outer packaging, for retail sales appeal.

Packs and Products available are:

A 450 g (16 oz.) single-serve full meal, which is popular in hospitals and staff canteens.

A choice of 11 dishes include chicken curry, sweet and sour pork, sausages in gravy, sliced beef in gravy, curried prawns, sliced lamb, Madras curry, steak and kidney, chicken chow mein, roast chicken, and Hungarian goulash.

Vegetable and mashed potatoes or rice are included in separate compartments of the tray.

A 2 kg (4.4 lb.) tray pack for caterers or homes.

Products in about 20 varieties include sliced meats in gravy, stews and other prepared meats, poultry, seafood and foreign dishes.

A 1 kg (2.2 lb.) tray pack for home freezers.

In this sized pack are prawn curry, sweet and sour pork, steak and kidney, Hungarian goulash, chicken chow mein, curried chicken, chicken a la king and sukiyaki.

The 2 kg and 1 kg (4.4 and 2.2 lb.) packs are for serving as a main course with vegetables or rice, as an entree or as a supper or party snack.

Meat Products in Bulk of Consumer Quantities

Meats and meat products marketed by W. Pope and Co. Pty. Ltd., 128 Charles Street, Perth, Western Australia 6000, are exported to more than 40 countries and are sold widely throughout North America, Asia, Europe and the Middle East.

The company specialises in certified Hallal slaughtering of mutton, beef and young sheep, and all meats are selected to suit particular markets.

Among the beef products are manufacturing meat trimmed to 90 visual lean and packed for shipment in 27 kg (60 lb.) cartons. Bone-in and boneless prime cut are of first, second or third quality. They are available in chilled, aged frozen or frozen form.

Chilled, vacuum packed beef, lamb and mutton are marketed in 450 g (1 lb.) consumer packs, in catering packs for the super-market and hotel trades or in individual prime cuts.

Veal and pork also are marketed in consumer and catering packs. Hamburgers

beef sausages and pork sausages are marketed in similar packs. Consumer packs of eight hamburgers are sold under the 'Uncle Judd's' brand.

Ingredients in hamburgers can be varied to suit individual market tastes. Sausages are made to an old English recipe.

All types of offal are marketed in 27 kg (60 lb.) bulk packs, in consumer packs or individually wrapped.

All products are prepared under rigid hygiene conditions and can be air-freighted quickly to any part of the world.

Asian Trade Fair

Australia's Second Asian Trade Fair will be staged in Melbourne from 28th May to 5th June 1977 at the Exhibition Building. It will be the largest exhibition of Asian goods yet held in the Southern Hemisphere.

It follows the successful 1975 Asian Trade Fair described by participating nations and individual companies as an outstanding success, with millions of dollars worth of goods sold and orders still being received.

It provides an opportunity to display a wide variety of Asian products to a largely affluent audience. Nations and individual companies will be provided with an economical method of introducing products and services to rapidly expanding industrial, commercial and consumer markets. Many will use the Fair to appoint Australian agents, distributors or retailers. Special times have been set aside for the Australian public to buy goods displayed.

The Australian Government and the Victorian State Government are patrons of the Fair, supported by the Melbourne City Council as host. It will be sponsored by the Melbourne Chamber of Commerce and the Confederation of Asian Chamber of Commerce and Industry.

Among Asian and Pacific area countries participating are Indonesia, India, Pakistan,

Malaysia, Thailand, Japan, South Korea, Philippines, China, Sri Lanka, Hong Kong, Nepal, Bangladesh, New Zealand Governments and private companies.

It has booked 3000 sq. m (32,000 sq. ft.) of display space to exhibit a wide range of equipment including machine tools, engineering, scientific and medical items, jewellery and household goods, together with cultural displays and national achievements.

Public attendance at the Fair is expected to exceed 200,000, one of the highest attendance figures for any Australian exhibition or trade fair.

Overseas companies intending to exhibit should contact their own Government trade export department for information or write direct to Riddle Exhibition Promotions Pty. Ltd., 166 Albert Road, South Melbourne, Victoria, Australia 3205, who are the organisers of the Fair.

Those unable to secure a Government booth can, in some instances, participate individually by negotiating direct with the organisers.

WEST GERMANY

ANUGA—1977

ANUGA—World Food Market will be held in Cologne between 10-15 September 1977. This fair held every alternative year offers opportunities for visitors for contacts with a view to collecting information and book orders.

The fair is divided into three sections—Consume group will have foods and provisions of all kinds including institutional Food Services such as hotel and restaurant trade; Systeme will exhibit vending machines for food service, display system, furnitures and equipment for the restaurant trade; and Technica section will exhibit machinery and equipment for food processing and packaging, grocery.

INDIAN FOOD PACKER

There are 211,000 hotels and restaurants in the catering trade in the Federal Republic of Germany. The total turnover in 1975 amounted to DM 33,000 million of which 80 per cent is by catering. The turnover statistics show that the West German catering business increased the total turnover by 57 per cent between 1968 and 1974. During this period, turnover growth was above average particularly at leisure and holiday homes, camping sites, drink and snack-bars and canteens.

12.6 million daily meals were served away from home in West Germany in 1975; the figure is expected to be 15 million by 1980 and 18 million by 1985. This shows the great importance of one form of food service—the institutional food service—which has developed with the progressive advance of industrialization, has produced new procedures and has followed a very successful course in the face of an increasingly complicated modern industrial society. Today every fifth member of the West German population eats out in restaurants, at hospitals, institutes and homes, in canteens run by works, the armed forces, frontier guards and Police, in snack bars, in the shop, many obtaining snacks from vending machines or 'eating on wheels' in railway dining cars.

Institutional food services can be regarded as a very varied and rewarding market which is given very good future opportunities. The ANUGA systema section presents for this purpose technical facilities and equipment ranging from systems for smaller units serving about 20 to 30 persons down to complete volume-feeding arrangements catering for thousands of people. All important factors relating to production, processing, storage, transport, distribution, disposal and clearance are dealt with in detail. A special display termed *Gastrovision* offers suitable suggestions for dealing with catering problems and supplements the products offered by manufacturers.

The food industry is hoping to find out more about the way sales will develop in the future from this ANUGA 1977—World Food Market—which is taking place in Cologne from the 10th to 15th September. The drinks manufacturers, in particular, form one of the largest suppliers' groups at the ANUGA, and are confident of continuing growth following good sales results in 1976.

For participation and the other details:

Messe-und, Ausstellungs-Ges.m.b.h.
koln, C/o Herrn Bucerius/Klein, Postfach
210760, D-5000 Koln 21, or

The Indo-German Chamber of
Commerce, 'Maithri', 19, Cathedral Road,
Post Box No. 4905, Madras-600086.

ROME

FAO Programme

The Technical Co-operation Programme launched by the UN Food and Agriculture Organization (FAO) has, in its first half year, provided aid to 22 countries in four continents for projects ranging from rural market development in Brazil to crop seed improvement in Laos and Vietnam.

Part of the aid has been sent to meet emergencies such as that in the Philippines following last summer's disastrous earthquake and the remainder has been designated for short-term but urgent agricultural and rural projects. As of January 1977, a total of almost \$2.5 million had been committed out of the \$18.5 million allocated. Requests for another \$4 million are under consideration.

Conceived by Mr Edouard Saouma, who became Director-General of FAO a year ago, the Programme is designed to serve as a catalytic agent in spurring agricultural development in the Third World, utilizing FAO's technical and financial resources to realise quick-action, small scale projects in direct co-operation with interested governments.

The FAO Council last July approved Mr Saouma's proposal to launch the fire-brigade operation out of savings garnered from the suspension or cancellation of unfilled posts, meetings and publications during the 1976-77 biennium. FAO field projects are normally financed out of extra budgetary funds provided by international development agencies and other donors. The advent of the Technical Co-operation Programme (TCP) marked for the first time that FAO had its own funds for development.

Currently, more than 40 emergency and regular TCP project requests are being considered. Proposals for projects are generally submitted by governments and evaluated as quickly as possible by FAO experts before being approved by the Director-General. Priority is given to projects in the poorer countries and each project is limited to a maximum time of one year.

TCP projects are intended to foster and facilitate agricultural, fishery and forestry development by offering a starting point for action or to unblock situations impeding development. The programme also aims as one of its priorities to identify and prepare investment projects for financing through traditional lending agencies, such as the World Bank, regional development banks.

UNIDO

Tenth Anniversary

The United Nations Industrial Development Organization (UNIDO) completed 10 years of its formation on 17th November in Vienna. The President of Austria; United Nations Secretary-General, Kurt Waldheim; the President of the UNIDO Industrial Development Board; the Executive Director of UNIDO, Dr Abd-El Rahman Khane; and the Chairman of the UNIDO Staff Council, spoke on the occasion. Commemorative stamp honouring the

occasion was released by Austrian Postal Administration. A new UNIDO Advisory Committee consisting of 11 organs and specialised agencies of United Nations under the Chairmanship of Executive Director of UNIDO, Dr Abd-El-Rahman Khane, was formed with the following members:

United Nations Department of Economic and Social Affairs (UN/ESA)

United Nations Conference on Trade and Development (UNCTAD)

United Nations Environment Programme (UNEP)

United Nations Development Programme (UNDP)

International Labour Organisation (ILO)

Food and Agriculture Organization of the United Nations (FAO)

United Nations Educational, Scientific and Cultural Organization (UNESCO)

World Health Organization (WHO)

International Bank for Reconstruction and Development (IBRD)

World Intellectual Property Organization (WIPO)

The United Nations Officer for Inter-Agency Affairs and Co-ordination is an *ex-officio* member. Other organizations may also join; in any case they will be consulted wherever their interests are affected.

UNIDAC is intended to serve as a forum for harmonizing the objectives, strategies and programmes of the United Nations system related to industrial development.

Pesticides for Better Crop

United Nations Industrial Development Organization (UNIDO) and the UN Economic and Social Commission for Asia and the Pacific (ESCAP) organised a symposium in Bangkok from February 1 to 7, 1977 on ways of promoting increased production and use of pesticides for achieving better agricultural returns.

The symposium was attended by representatives from India, Afghanistan, Bangladesh, Fiji, Hong Kong, Indonesia, Japan, Malaysia, Pakistan, Papua New Guinea, Philippines, Sri Lanka, Singapore, Thailand and Niue Island.

The participants met in three working groups to consider matters relating to production, distribution and marketing of pesticides. In particular, they examined problems relating to the availability and exploitation of raw materials, projections of regional requirements, new technical developments and mechanisms for transfer of technology.

Traditionally, pesticides have been used in irrigated and heavy rainfall areas. The symposium considered the need for an early warning system to facilitate preventive measures for crop protection and efforts needed to promote the use of pesticides in dry land area where productivity, and production was uncertain.

A study has estimated that some 20 per cent of agricultural produce was lost annually because of pests. In India alone, agricultural losses in 1973-74 amounted to about US \$ 5 billion, a little more than the country's total foreign exchange earnings for 1974-75.

The purpose of the symposium was to consider and recommend guidelines which will improve food production and agricultural output in the ESCAP region and at the same time safeguard public and animal health.

Industrialisation was a pre-requisite for the general development of a country.

NETHERLANDS

Investment and Industrial Corporation

The United Nations Industrial Development Organization (UNIDO) and Food and Agricultural Organization (FAO) held a meeting between 21-25 October 1974 to

MARCH—APRIL 1977

promote investment and industrial co-operation in selected Food Processing Industry in the Royal Tropical Institute, Amsterdam.

The main objective of the meeting was to encourage flow of resources such as capital, plant and equipment, management and marketing skills, and Technology Transfer. Prior to the Meeting the project proposals were submitted to the Secretariat. They were then distributed to the appropriate business community in the industrialised country in the form of project information/questionnaire. The Focus of the meeting was restricted to the following industries:

- (i) Sugar
- (ii) Vegetable oils and proteins
- (iii) Fruits and vegetables
- (iv) Non-alcoholic beverage
- (v) Food processing and packaging equipment
- (vi) Food packaging materials.

The Amsterdam meeting accepted 78 projects, 67 members from 28 developed countries and 26 members from 18 industrialised countries attended the meeting.

The Secretariat sent the questionnaire form from March 75. 70 organisations out of 110 responded, 29 proponents sponsoring 47 projects responded.

There are 23 specific food processing projects in progress at various stages namely:

Algeria (7 projects), Bangladesh (2), Burundi (1), Colombia (1), Haiti (1), Indonesia (3), Malaysia (1), Mali (1), Pakistan (1), Sierra Leone (1), Sudan (1), Swaziland (1), Upper Volta (1), and Yugoslavia (1).

In addition 8 projects are in progress through their own business channels, independent of the Meeting.

YUGOSLAVIA

UNIDO Meeting

United Nations Industrial Development Organization (UNIDO) will hold a meeting

at Belgrade to promote investment and industrial co-operation in selected food processing and allied industries from 31 October to November 1977. The Yugoslavia Chamber of Economy will provide for the facilities and services required for the meeting.

In most of the developing countries agro-based industries is the logical and natural starting point for industrialization. Many developing countries export agricultural produce in the form of unprocessed commodities. Development of food processing industries in these countries will increase the value of their exports.

The objectives of the Belgrade meeting is to facilitate at the project level the transfer of appropriate technologies, capital goods, management and marketing skills, consulting services etc., from the industrialised to the developing countries and to acquaint sponsors of projects in developing countries.

The project proposals will be restricted to the following industries, both new and those involving expansion and diversification of the existing ones:

- Fruit and vegetable processing
- Meat processing including by-products
- Vegetable oils and fats
- Sugar and sugar industry by-products
- Cereals milling and product
- Alcoholic and non-alcoholic beverages
- Food packing
- Food processing machinery and equipment.
- Leather and leather products.

The meeting will be largely devoted to personal bilateral discussions. Participants therefore should include senior representatives of organisations in developing countries; from firms including manufacturers, traders, and consultants in industrialised countries, and from financing institutions with international interest both

in developing and industrialised countries and are likely to help finance industrial projects. Given sufficient notice hotel reservation could be arranged at concessional rates.

Those interested to take part may please get in touch with the Deputy Director, Investment Co-operative Programme office, United Nations Industrial Development Organization, Lerchenfelder Strasse 1, A-1070 Vienna, Austria.

KUWAIT

Fresh Vegetables

Kuwait offers very good prospects for the sale of fresh vegetables as the country, lacking cultivable land and with a hostile climate depends entirely on imports to meet its requirements. Total import figures for the years 1973 to 1975 are given below:

1973

Value (KD)	Wt. (kg)
2,653,576 (Rs. 78m)	67,725,412

1974

Value (KD)	Wt. (kg)
3,619,972 (Rs. 108m)	68,321,620

1975

Value (KD)	Wt. (kg)
4,877,091 (Rs. 146m)	73,440,295

The demand for vegetables is expected to increase further with the increasing influx of manpower into Kuwait.

Although exports of fresh vegetables from India have been rising steadily, India's share of the total market is quite small and is limited to the special and specific requirements of a minor segment of the population, viz., Indians and Pakistanis residing in Kuwait. Varieties of vegetables which are consumed by the majority of the popu-

lation, and imported in bulk quantities are tomatoes, potatoes, okra (lady's fingers), brinjal, cauliflower, cabbage, capsicum, beans, sweet peas, marrow, carrots, turnips, beetroots and other green leafy vegetables particularly spinach and lettuce.

These are cultivated in abundance in the neighbouring countries like Iran, Iraq, Saudi Arabia, Lebanon, Jordan and Syria and are imported into Kuwait mainly by refrigerated road transport. The proximity of the Kuwait market gives the suppliers from these countries an edge over Indian exporters—who, because of expensive air-freight costs, confine themselves to exporting items which are not grown in these areas or those which are in short supply during off season.

There are no restrictions on the import of fresh vegetables except those applied to products of Israeli origin and their imports are permitted free of customs duty.

The health regulations are, however, very strictly observed and each consignment is released only when it is certified free from any health hazard. A health certificate is also required to accompany the certificate of origin and other documents pertaining to each consignment.

Grading of the vegetables is not very consistent and is adhered to in case of Cyprus and Holland.

Port authorities in Kuwait have reserved one berth for unloading perishable food products which provide berthing facilities to ships carrying food and reefer cargo out of turn on their arrival. Goods are also permitted to be unloaded on barges.

The neighbouring countries are supplying 10 to 12 kg of fresh vegetable in light white wood crates or cartons (Indian vegetables are imported in 20/25 kg baskets).

Import Prices: Landed costs fluctuate not only according to the season but also with the availability of transport: C & F prices are generally 40 per cent less than

wholesale prices. As a rule the landed costs vary around 0.100 fils for potatoes and 0.150 to 0.200 fils for other fresh vegetables.

THAILAND

Preferential Terms for Agro Inputs

Regional Symposium for Asia and Pacific on the Production and Promotion of Pesticides and on Sub-regional and Regional Co-operation in Pesticide Industries was convened by the United Nations Industrial Development Organization (UNIDO) in co-operation with the Economic and Social Commission for Asia and the Pacific (ESCAP) in Bangkok to consider the possibility of increasing the production of pesticides and of promoting their wider use in the ESCAP region.

The symposium in Bangkok has called for preferential shipping terms for agricultural inputs, such as pesticides, to help reduce their prices in the hope that they would be more widely used in small holdings and large plantations alike.

A report of the symposium states that a reduction in the prices of pesticides without reducing its efficiency and safety was among factors that would encourage their wider use.

Noting that international freight charges were becoming very high, the symposium recommended that the United Nations Conference on Trade and Development (UNCTAD) should be requested to examine the possibility of preferential shipping terms for agricultural inputs including pesticides. Further, the symposium recommended that policies reduce the number of links in the distribution system in order to reduce the price of pesticides.

In a section dealing with specific areas of possible regional co-operation, the report states that the importance of pesticides in agricultural production and health pro-

grammes necessitates a co-ordinated plan for development of this input, in order to ensure an adequate and timely availability of supplies at economic prices. Production should also be taken into account on environmental safety, the report adds.

NEPAL

Road Project

The Asian Development Bank has approved a concessional \$ 4.8 million supplementary loan to Nepal to finance the foreign exchange component of the cost overrun of the Hetauda-Narayangarh Road Project, to provide a key all-weather link in the landlocked nation's major East-West Highway.

In December 1972, the Bank approved \$ 10.10 million concessional loan from its Special Funds resources to Nepal for the reconstruction and improvement of the

80 km gravel road between the important trading and business centres of Hetauda and Narayangarh, located in the fertile Terai Plain region of southern Nepal.

The road project, together with the Gandak-Hetauda Power Transmission Project and the Chitwan Valley Development Project, which are also financed by the Bank, will facilitate integrated development of the Chitwan Valley area, which has rich agricultural potential.

The existing road is in poor condition and remains virtually closed to traffic during the monsoon months of June through September. Under the project this gravel road is to be upgraded to a two-lane standard with a bitumen surface-dressed pavement, including the construction of two-lane bridges over four major rivers—Rapti, Manahari, Lothar and Narayani. The scope of the project will remain the same as originally conceived.

Trade Marks

(Trade Marks accepted by the Trade Marks Registry)

Sl. No.	Name and Address	No. and Date of the Trade Marks Journal publishing the Trade Mark	Official No. of Trade Mark	Date	Products	Trade Mark
M/s						
1.	The Tata Oil Mills Company Limited, Bombay House, 24 Homi Mody Street, Fort, Bombay-400 023	663/16.1.77	312,926	5.3.76	Canned, bottled and dehydrated vegetables, soup and soup powder, milk and other dairy products for food, tomato juice and canned fruits	Milpro (Class-29)
2.	Rakki Food Products, 40 Sekkizar Street, Chokkikulam, Madurai 2, Tamil Nadu	663/16.1.77	312,563B	19.2.76	Squashes, fruit juices, syrups for making beverages, mineral and aerated waters and non-alcoholic drinks	Rakki (Class-32)
3.	Muthu Vilas Syrup Company 11/46 Chinnakadai Bazaar Paramakudi, Ramnad District Tamil Nadu	664/1.2.77	269,318	8.1.77	Syrup for making beverages	Muthu vilas syrup (Class-32)
4.	Ciba Limited, Klybeckstrasse, Basle, Switzerland	666/1.3.77	254,647	7.2.1969	Meat, fish, poultry and game; preserved, dried and cooked fruits and vegetables, milk and other dairy products for food; edible oils and fats and pickles	Binaca (Class-29)
5.	Nestle's Products Limited Nestle House, Collins Avenue, Nassau, Bahamas Island	666/1.3.77	290,491	30.8.1973	Vegetables, fruit, meat, poultry, fish and products originating from the sea in the form of extracts, of soups, of jellies, of pastes, of preserves, or ready made dishes and of frozen and/or dehydrated preserves, as well as in crisp form; milk and milk substitutes, and milk based food preparations included in class 29	Nestle (Class-29)
6.	The Andhra Pradesh State Agro Industries Corporation Limited, 10-2-3, A.C. Guards, Hyderabad-500 004	667/16.3.77	313,796	7.4.1976	Fruit juice based non-alcoholic beverages	Pingo (Class-32)

Government Notifications

- *Fixation of Brand Rate of Drawback*
 - *Drawback Payment Order*
 - *Diversion for Home Consumption*
 - *Classification/Price Lists*
 - *Meat Food Products Advisory Committee*
 - *Export Inspection Council*
 - *Development Council for Sugar Industry*
-

Fixation of Brand Rates of Drawback

The Directorate of Drawback, New Delhi, has observed that in respect of many commodities where all industry rates are available, some parties prefer applications for Brand Rates without satisfying themselves regarding the provisions of Rule 7 of the Customs and Central Excise Duties Drawback Rules, 1971, with the result that there is unnecessary work all round in the matter of verification of data and fixation of drawback rates.

The exporters are advised that such applications should be avoided. It is only in cases where they consider that the provisions of Rule 7 are satisfied, they should come up with application for fixation of special Brand Rates.

For the benefit and information of Trade, Rule 7 of the Customs and Central Excise Duties Drawback Rule, 1971, is reproduced below:

Rule 7: Cases where amount or rate of Drawback determined is low

(1) Where, in respect of any goods, the manufacturer or exporter finds that the amount or rate of drawback determined under Rule 3 or, as the case may be, revised under Rule 4 for that class of goods is less

than three-fourths of the duties paid on the materials or components used in the production or manufacture of said goods, he may make an application in writing to the Central Government for fixation of appropriate amount or rate of drawback stating all relevant facts including the preparation in which the materials or components are used in the production or manufacture of the goods and the duties paid on such materials or components.

(2) On receipt of the application referred to in sub-rule

(i) The Central Government may, after making or causing to be made such enquiry as it deems fit, allow payment of drawback to such exporter at such amount or at such rate as may be determined to be appropriate if the amount or rate of drawback determined under Rule 3 or, as the case may be revised under Rule 4, is in fact less than three-fourths of such amount or rate determined under this sub-rule.

(Drawback T.N. No. 24/Deec (3)/ Drawback/77, dated 18th March 1977)

Drawback Payment Order

The Assistant Collector of Customs, Drawback Dept., Bombay, has informed that, with effect from 1st April 1977, exporters should use the Drawback Payment Order, format in respect of which is reproduced. The idea is that while this Drawback Payment Order is folded the address of the exporter has to appear at the appropriate place in the window-type cover which will be used for despatch of the drawback payment orders to the exporters. The Assistant Collector has further informed that the exporters may use better quality paper and if they so desire they can put such payment order form fully filled, in a self

addressed envelope, properly closed, which should be attached alongwith the shipping bill, while presenting them in the export department.

Instructions

NB: This order should be presented for payment within 90 days of the date of issue, to the Accounts

By Regd. Post/Ordinary Post
Drawback Payment Order

(to be attached to the
Shipping Bill in duplicate)

To be filled in by
the exporter while
presenting shipping bill

Below

Claim No.....

Brand Rate/All Industry Rate

Address of Exporters

.....

.....

.....

Pin Code

Rupees.....

Drawback Department,
Transport House,
Poona Street,
Bombay—400 009

Dated:

NB: For instructions, please
see overleaf.

Pre-audit Stamp

"A" To be filled in by
the exporter while
presenting the S/Bill

Sir :

Sub: Drawback S/Bill No.....dated.....

per s.s.....goods.....value FOB/PMV

Rs.....(Net) Wt..... (description

(Net)

packing material.....value FOB/PMV Rs.....Net

Wt. Sub-serial No. (of Drawback Schedule).....

Amount of drawback claimed by the exporter Rs..... with reference to the above export, I have to inform you that your claim for drawback has been admitted for Rs.... (Rupees.....) and that on presentation of this order duly receipted below the above sum will be paid by the Accounts Department, New Custom House, Bombay-38. Noted in the Bill of Entry/Shipping Bill and certified that no previous drawback payment order for the same has been issued.

Department, New Custom House, Ballard Estate, Bombay-400 038, by the party to whom the order is payable or through their Bankers on a working day before 2.30 p.m. It may be endorsed to bearer or transfer to credit of deposit accounts. Separate signature when the order is endorsed for payment to bearer is absolutely necessary. Portion 'B' to be retained by the exporter while

For the use of
Account Dept.

Allocation: Customs Rs..... Rate of allocation Rs.....

Packing material Rs..... Rate of allocation
Rs.....

Cen. Excise Rs..... Rate of allocation.....

Packing material Rs..... Rate of allocation
Rs.....

Post Audit Clerk

Appraiser/Asst. Collector of Customs

Received the above sum

Rs. 0.20 receipt stamp for sum exceeding Rs. 20/-

Pay the above sum of Rs.....

Passed Chief Accounts Officer of Customs

Account Customs New Custom House, Bombay—400 038

To be Filled in by the Exporter

Claim No.....Drawback Shipping Bill No.....

.....dt.....per s.s.....

.....is admitted for Rs.....(Rupees.....)

.....)

"B" To be detached and
retained by the exporter while presenting
the Drawback Order form for encashment

*submitting Drawback Payment
Order for payment.*

Diversion for Home Consumption

Central Excise—Excisable goods intended for Export outside India in Bond—Rule 9A (3): Diversion of for home consumption on cancellation of export order—

Rule 9A (3) of the Central Excise Rules, 1944, which hitherto envisaged diversion of the excisable goods cleared for export in Bond only, with the permission of the Collector of Central Excise, has been amended vide Government of India's Notification No. 141/74 dated 28.9.1974. As a result of this amendment, need for prior permission for diversion of goods cleared initially for export, for home market, has been done away with.

The following procedure should be followed in the case of excisable goods which

are removed for export in bond but which are diverted for home consumption due to cancellation of export orders.

2. An exporter intending to divert for home consumption the whole or part of the consignment cleared for export in bond should send an intimation in duplicate, in the following form together with the original and duplicate copies of the A.R. 4/A.R. 4A application relating to such goods to—

- (a) the Assistant Collector of Central Excise in whose jurisdiction the factory or warehouse from which the goods were removed for such export is located and also to
- (b) the Maritime Collector of the port through which the exporter intended to export the goods.

3. Before diverting such goods for home consumption, the exporter will pay the Central Excise duty due thereon either

through the Personal Ledger Account or in the Treasury of the Chief Accounts Officer, Central Excise, Bombay and thereafter inform in writing, both the Assistant Collector and the Maritime Collector in the manner referred to in para 2 above.

4. The rate of duty or tariff value for the purpose of payment either through the P.L.A. or in the treasury of the Chief Accounts Officer, Central Excise, Bombay, will be the rate in force on the date on which the payment is made in the Treasury of the Chief Accounts Officer, Central Excise, Bombay.

To

The Assistant Collector of Central Excise/

The Maritime Collector.

Sir,

I state that, due to cancellation of export order, the undermentioned quantity of the excisable goods cleared from..... (factory or warehouse) in form A.R. 4/A.R. 4-A No.....dated.....(the original and duplicate enclosed) is being diverted from home consumption on.....has been diverted for home consumption on..... (here enter the date)

Particulars of goods diverted

.....

1. Description of goods
2. Identification marks
3. No. and description of packages
4. Quantity
5. Amount of duty due
6. Proof of payment, i.e., the extract of the P.L.A.

.....
Signature

Classification/Price Lists

Central Excise-approval of Classification/Price lists by the proper officer, Central

Excise-Stipulation of schedule of time for according approval—regarding.

The trade is hereby informed that the following time schedule has been prescribed for according approval of classification/price lists by the concerned proper officers of the Central Excise:

(i) In case where all the necessary information/details have been furnished by the assessee, a period of 15 days has been fixed for according approval of the classification/price lists by the proper officer.

(ii) In cases where Chemical Examiner's report is required, the time limit is one month.

(iii) In cases where a certain article is put to more than one use and the question of deciding its excisability under one or another tariff item may require a personal hearing to be given to the party to explain his stand or views or where on-the-spot study is called for or consultations with experts may be required, the time limit fixed is two months.

(iv) In the case of new products involving verification of goods/invoices the period of time fixed is three months.

2. The above time schedule is reckonable from the date of receipt of the classification/price lists in the Range Office having jurisdiction over the assessee. The time limit will not apply in cases where the classification/price lists do not contain all the necessary information/details and the same have been returned to the assessee for rectification of omissions/defects pointed out. The time schedule will, in such cases, commence only on receipt back of complete documents duly rectified/corrected/filled up.

3. The above instructions have been issued taking into consideration the problem of delays in the approval of the classification/price lists and with a view to eliminate inconvenience and uncertainty caused to all concerned.

4. In view of the above, the assesseees are requested to extend their full co-operation in furnishing all the required information/details in the classification lists and price lists filed by them under Rule 173B and 173C respectively so as to enable the Central Excise Officers to approve the same without any delay within the prescribed time schedule. They should particularly ensure that the classification and price lists are filed in the prescribed form accompanied by all the additional information such as reasons for any decrease in the approved price, change in sale and marketing pattern, copies of contracts etc. [CE Trade Notice No. 13/17 (general) dated 10.1.77].

Meat Food Products Advisory Committee

In exercise of the powers conferred by sub-clause (1) of clause 3 of the Meat Food Products Order, 1973, the Central Government hereby constitutes the Meat Food Products Advisory Committee consisting of the following persons for a period of two years with effect from the date of publication of this Order in the Official Gazette, namely:

Chairman

Agricultural Marketing Adviser to the Government of India.

Members

1. Animal Husbandry Commissioner, Government of India or his nominee.
2. Director-General of Health Services, Government of India or his nominee.
3. Director-General of Technical Development, Government of India or his nominee.
4. Executive Director, Food and Nutrition Board, Department of Food, Government of India or his nominee.
5. Director, Central Food Technological

Research Institute, Mysore or his nominee.

Two officers of the Department of Animal Husbandry or Veterinary Services of the states nominated by the Central Government under item (f).

6. Shri Lohit Reddy, Assistant Director (Marketing and Publicity), Forests and Rural Development Department, Government of Andhra Pradesh, Hyderabad.
7. Dr V. S. Asthana, General Manager, Department of Animal Husbandry, Government of Uttar Pradesh, Aligarh.

Two persons from among the manufacturers nominated by the Central Government under item (g).

8. General Manager, Government Bacon Factory, Harringhata, Calcutta.
9. Managing Director, Mafco, Mistry Bhavan, 6th Floor, Dinshaw Vachbha Road, Bombay.

An officer of the Directorate of Marketing and Inspection nominated by the licensing authority under item (h).

10. Senior Marketing Officer (Meat Food Products Order), Directorate of Marketing and Inspection, Faridabad.

The Senior Marketing Officer (Meat Food Products Order), Directorate of Marketing and Inspection, Faridabad, shall act as the Secretary of the said Committee.

(Order No. S.O. 614, dated the 19th January 1977)

Export Inspection Council

In exercise of the powers conferred by section 3 of the Export (Quality Control and Inspection) Act, 1963 (22 of 1963), read with Rule 3 of the Export (Quality Control and Inspection) Rules, 1964, the Central

Government appoints Shri S. G. Bose Mullick, Commerce Secretary, Ministry of Commerce, as Chairman and nominated the following as Members of the Export Inspection Council for a period of one year with effect from 1st January 1977.

1. Director of Inspection and Quality Control, Ministry of Commerce, New Delhi.
2. Director-General, Indian Standards Institution, New Delhi.
3. Agricultural Marketing Adviser to the Government of India.
4. Director-General, Commercial Intelligence and Statistics, Calcutta.
5. Joint Secretary (In-charge of Agmark), Ministry of Agriculture, New Delhi.
6. Secretary, Technical Development, New Delhi.
7. Member, Central Board of Excise and Customs.
8. Deputy Director-General (Inspection), D.G.S. and D., New Delhi.
9. President, Federation of Association of Small Industries.
10. President, Seafood Exporters' Association, Cochin.
11. Development Commissioner for Small Scale Industries.
12. Chairman, Federation of Indian Exports Organisations.
13. Shri V. H. Pancholi, Filco Pvt. Ltd., Sewri, Bombay.
14. Shri K. V. Gopinath, Mysodet Pvt. Ltd., Bangalore-25.
15. Shri M. N. Dastur, Dastur & Co. Pvt. Ltd., Calcutta.

Development Council for Sugar Industry

In exercise of the powers conferred by Section 6 of the Industries (Development and Regulation) Act, 1951 (65 of 1951),

MARCH—APRIL 1977

read with rules 3, 4 and 5 of the Development Councils (Procedural) Rules, 1952, the Central Government hereby appoints, for a period of two years with effect from 22.2.1977, the following persons to be members of the Development Council for Sugar Industry, namely:

Chairman

1. The Secretary, Department of Food, Ministry of Agriculture and Irrigation, New Delhi.

Members

2. The Joint Secretary-in-Charge of Sugar, Department of Food, Ministry of Agriculture and Irrigation, New Delhi.
3. The Chief Director, Directorate of Sugar and Vanaspati, Department of Food, Ministry of Agriculture and Irrigation, New Delhi.
4. The Agricultural Commissioner, Department of Agriculture, Ministry of Agriculture and Irrigation, New Delhi.
5. The Director, National Sugar Institute, Kanpur.
6. The Director, Sugarcane Breeding Institute, Coimbatore.
7. Shri I. Mahadevan, Joint Secretary, Department of Industrial Development, Ministry of Industry, New Delhi.
8. Shri K. Sundarajulu, Chief Director, Ministry of Civil Supplies and Cooperation, New Delhi.
9. Shri P. M. Belliappa, Jt Secretary and Financial Adviser, Department of Science and Technology, Technology Bhawan, New Mehrauli Road, New Delhi.
10. Shri Barbans Singh, Chairman, Indian Sugarcane Development Council,

'Cane House', 330, Model Town,
Jullundur (Punjab).

11. Shri K. L. N. Prasad, M.P. (Rajya Sabha), 11, Janpath, New Delhi-1.
12. Shri P. S. Gopalakrishnan, Asstt. General Manager, Industrial Finance Corporation of India, Bank of Baroda Building, New Delhi.
13. Secretary, Sugar Industry and Cane Development Department, Government of Uttar Pradesh, Lucknow.
14. The Cane Commissioner, Government of Bihar, Patna.
15. Director of Sugar, Government of Tamil Nadu, 33, Anna Salai, Nandanam, Madras.
16. Chief Sugarcane Development Officer, Government of Maharashtra, Poona.
17. Director of Sugar, Government of Andhra Pradesh, Hyderabad.
18. Director of Sugar and Additional Registrar of Co-operative Societies, Bangalore.
19. Shri K. S. Sharma, Director of Industries, Government of Madhya Pradesh, Bhopal.
20. The President, Sugar Technologists' Association of India, P.O. National Sugar Institute, Kalyanpur, Kanpur-208017.
21. Shri Anil Kumar Ruia, President, Indian Sugar Mills Association, C/o M/s Kolhapur Cane Sugar Works Ltd., Udyog Bhavan, Walchand Hirachand Marg, Ballard Estate, Bombay-400 001.
22. Shri P. K. Kanoria, Vice-President, Indian Sugar Mills Association, C/o Pratappur Sugar and Industries Ltd., 9, Brabourne Road, Calcutta.
23. Shri P. Maruthai Pillai, M/s Aruna Sugar Ltd., Mecco House, 11-A/1, Mount Road, Madras-2.
24. The Chairman, Uttar Pradesh State Sugar Corporation Ltd., 26-B Ashok Marg, Lucknow (U.P.).
25. Shri R. L. Shukla, President, Federation of Co-operative Sugar Factories, C/o 'Alok', P.O. Pilibhit (U.P.).
26. Shri S. G. Kolha, Chairman, National Federation of Co-operative Sugar Factories, Sanjiveni (Talki) Sahakari Sakhar Karkhana Ltd., Shinganapur, Distt. Ahmednagar.

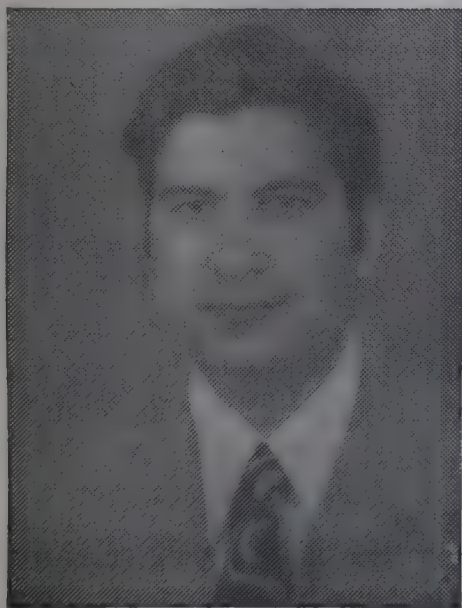
In pursuance of clause (c) of the note 2 of the Development Council (Procedural) Rules, 1952, the Central Government hereby appoints Shri A. K. Bose, Deputy Director (Sugar Technical), Directorate of Sugar and Vanaspati (Department of Food), to carry on the functions of Secretary to the said Development Council.

(Notice No. S.O. 703-IDRA/6/1/77, dated 22.2.1977).

Men and Companies

- *Shri Ravi P. Awasthi*
 - *Dr G. A. Sulebele*
 - *Dr S. Ramaswamy*
 - *Shri T. K. Govindan*
 - *Shri S. K. Bakshi*
 - *Shri R. A. Varma*
 - *UPASI Tea Scientific Department*
 - *Indian Veterinary Research Institute, Izatnagar*
 - *The Southern India Shippers' Association*
 - *CFTRI—Short-Term Course in "Fruit and Vegetable Technology"*
 - *The Maharashtra Agro-Industries Development Corporation Ltd.—NOGA*
-

Shri Ravi P. Awasthi



Shri Ravi Awasthi is the UNIDO (United Nations Industrial Development Organization) Food Technologist, presently assigned to Tanzania.

Born on July 26, 1936, he received his M.Sc. (Tech.) in Industrial Chemistry from the Banaras Hindu University. Later, he joined the Associateship course in Chemical

Technology and General Research at Harcourt Bulter Technological Research Institute, Kanpur. Joining the British India Corporation's Begg, Sutherland and Co. in Marhowrah, Bihar, he made his way to be a Chemist in Balrampur and Tulsipur sugar companies. From 1960 to 1962, he worked for the Gur and Khandsari Research Scheme, first at the Indian Institute of Sugarcane Research, Lucknow, which was later attached to the National Sugar Institute, Kanpur and thence to the Planning Research and Action Institute, Lucknow, where he was actively associated in the development of Open Pan Sulphitation Process of Khandsari Sugar Manufacture.

In 1962, he joined the Midlands Fruit and Vegetable Preservation Industry at Mathura, and later worked for G. G., Mohan's and Sun-Sip.

Shri Awasthi planned, programmed and wrote feasibility studies for Narang Brothers & Co. Ltd., New Delhi. In 1970, he went as Head of a special technical mission to Afghanistan on behalf of Alokudyog Overseas Ltd., New Delhi, to commission Czechoslovakia supplied, Afghanistan Government plant of the Kandahar Fruit Company—Shirkat-e-Mewa. As Chief Food Technologist, he wrote an exhaustive report on 'The problems and possible solutions of Shirkat-e-Mewa' for submission to the World Bank.

On return from Afghanistan, in May 1971, Shri Awasthi joined the first Indo-Mauritian joint venture in Mauritius—the Food Canners Limited—as its General Manager. The whole project from concept to commissioning and commercialization was managed by Shri Awasthi. Later, he was appointed as the Technical Director on the board of the company. The company's 'Sun Glory' products were very popular in

Mauritius and Francophone countries. Shri Awasthi's expertise was recognized by the United Nations Industrial Development Organization who offered him the Expert's job in Tanzania.

For a brief period in 1965, when the Samchi Canning Factory in Bhutan was managed by the Bhutan State Trading Corporation, Shri Awasthi acted as its consultant.

During the past 20 years, Shri Awasthi has rendered valuable services to the development of wide range of food processing industries. He has been actively involved, in variable degrees, in such food processing operations and consultancy exercises as processing of Fruits and Vegetables, Sugar and Confectionery, Brewery and Distillery, Bakery, Mushrooms and Cashewnuts, Tea and Instant Coffee, Meat and Fish, Dairy and Baby Foods including weaning foods and low cost high protein foods, Edible Vegetable Oil, Beverages and Convenience foods. For Tanzania, he drafted the Food Laws, Regulations and Standards which formed the basis for Tanzania Food Standards and Food Regulations.

Shri Awasthi has participated in technical assistance efforts in a number of countries. He helped develop a number of food processing industries in Tanzania, devised quality control and management techniques for citrus and pineapple products in Bhutan, worked on the raising of a multipurpose cannery in Mauritius, set up processing techniques and improved methods for pomegranate processing in Afghanistan, and worked on the profitability of producing nutritive and acceptable foods from locally available raw materials in India and abroad.

In Tanzania where he is helping develop food export industries besides rendering consultancy services to entrepreneur and the Government of Tanzania and training of counterparts, Shri Awasthi's main job has been to undertake studies on food indus-

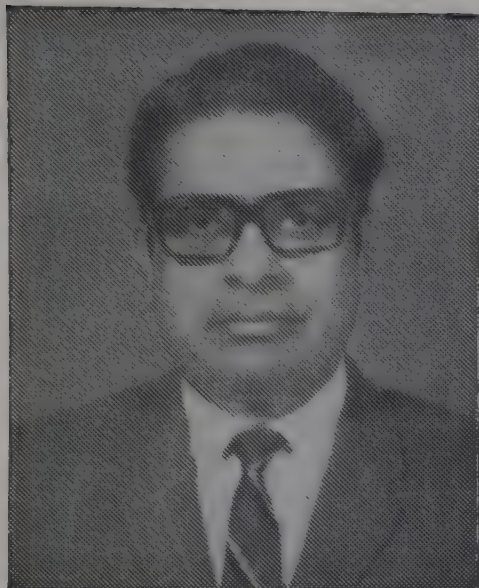
tries, their evaluation and implementation. He is responsible for the techno-economic feasibility studies, implementation, evaluation and followup of a number of projects including three integrated fruit and vegetable canneries, one mobile fruit and vegetable processing demonstration unit, three multipurpose vegetable oil mills, a solvent extraction plant for oil cakes, an oil palm estate and factory, one 100 per cent export oriented lime juice processing plant, a Baby Food project, a still fruit drink (Tetrapack) packing unit, one convenience ready-to-serve food factory and a Khandsari sugar plant.

Shri Awasthi is a member of a number of International Scientific and honorary societies which include Institute of Directors, London; The Sugar Technologists' Association of India, Kanpur; British Institute of Management, London; Institute of Food Technologists, Chicago, U.S.A.; New Zealand Institute of Food Science and Technology, Palmerston North; Canadian Institute of Food Science and Technology, Ontario; Australian, Institute of Food Science and Technology, North Ryde; Japanese Society of Food Science and Technology, Tokyo; Association of Food Scientists and Technologists (India), Mysore; American Society for Quality Control, Milwaukee; American Association of Cereal Chemists Inc., Minnesota; American Oil Chemists' Society, Champaign; Swedish Association of Food Technologists, Stockholm.

He has travelled widely in Europe, Asia and Africa and has participated in a number of seminars and workshops on Food Processing and Management.

Dr G. A. Sulebele

Dr G. A. Sulebele has taken over charge as Project Administrator and Co-ordinator, Miltone Project, Food and Nutrition Board,

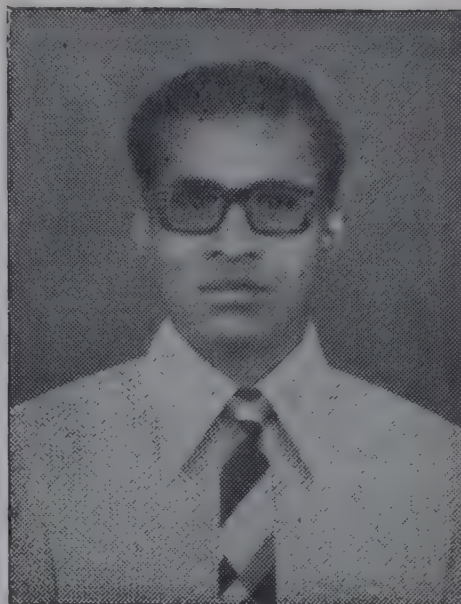


Government of India, with headquarters at Bangalore since October 1976.

Dr Sulebele was educated at the Department of Chemical Technology, University of Bombay, where he obtained his B.Sc. (Tech.) and Ph.D. (Tech.) in Food Technology. After a four-year stint as a post-doctoral research fellow at the State University of New York, he took up a teaching and research career at his alma-mater which he served for more than six years. During this time, he guided several research students for the M.Sc. and Ph.D. degrees of the University of Bombay. He is very much interested in food microbiology, protein technology and industrial fermentations. Dr Sulebele served as Hon. Secretary and Vice-President of the Association of Food Scientists and Technologists (India), Western Region. He is a member of the Protein Quality Evaluation and Protein-rich Foods sub-committees of the Indian Standards Institution.

Dr S. Ramaswamy

Dr S. Ramaswamy is the Tea Technologist, United Planters' Association of Southern India—Tea Research Station (UPASI T.R.S.), Cinchona, Coimbatore Dist., Tamil Nadu.



Born on 4th July 1942, he did B.Sc. degree with Chemistry and Physics from the University of Madras in 1962. For more than two years he served as Science Assistant in both Management and District Board High Schools of Tirunelveli District of then Madras State. He joined the Department of Chemical Technology, University of Bombay, in 1965, in the first batch of the three years degree course in Food Technology and obtained B.Sc. (Tech.) degree in 1968. After completion of the theory part of M.Sc. (Tech.) degree creditably in the following year, his registration was transferred to Ph.D. and in 1974 the University of Bombay conferred the degree of Doctor of Philosophy in Food Technology for the thesis entitled 'Chemistry and Technology of Vegetables'.

During the tenure of his Research Scholarship, he was holding the position of Associate Lecturer in the Bombay University, Department of Chemical Technology, for three years since 1972. He was awarded various scholarships for his meritorious studies in degree courses. He has a number of publications to his credit. At present, he is the head of the division of Tea Technology, UPASI T.R.S., Cinchona and working on innovations and improvements in Tea

Manufacture as well as on Chemistry of Tea clones.

Shri T. K. Govindan



Shri T. K. Govindan, at present Technologist in the All India Co-ordinated Research Project on Transportation of Fresh Fish, has been inducted into Agricultural Research Service (A.R.S.) in the Grade S-2. This is a new all India Scientific Research Cadre for agricultural scientists constituted by the Indian Council of Agricultural Research on a par with the other all India services. Shri Govindan has made notable contribution to the discipline of fish processing technology through his more than one hundred and fifteen publications during his two decades of service. The fields covered by his research publications include biochemical aspects of fresh and preserved (iced and frozen) fish, quality control of fresh and processed fishery products, curing and canning preservation of fish, freeze drying of fresh and prepared foods from fish and transportation of fresh fish. Besides, he is author of a large number of popular articles on various aspects of fishing and fish processing industries in our country. He has recently been transferred to the headquarters of the Central Institute of

Fisheries Technology at Cochin from its Kakinada Research Centre.

Shri S. K. Bakshi



Shri S. K. Bakshi has joined Tims Products Ltd., Calcutta, on 1st October 1976, as Senior Food Technologist. Earlier he worked with M/s Miki Food Products, Meerut (U.P.), as Food Technologist-cum-Manager from 1972 to 1976. He was looking after Canning as well as Dehydration Plants. He has set up a new 'Malt House' for them on the latest and modern techniques for the manufacture of Malt.

Shri Bakshi belongs to a well known family of J and K State. His father is a Rtd. District Magistrate. He was born on 4th October 1946 and graduated from Govt. Gandhi Memorial Science College (previously Prince of Wales College), Jammu, J and K University, in 1966. He has specialised in Marketing Management and Industrial Management in 1967-68 from Delhi University and Diploma in Canning and Food Preservation in 'First Class First' in 1968-69 from the Institute of Hotel Management, Catering and Nutrition, New Delhi.

Shri Bakshi started his career with one of the oldest and leading Food Processors of

India, G. C. Fruit Preserving Factory, Haldwani (Nainital), where he worked as Food Chemist, Food Technologist and then as Factory Manager from 1969 to 1972. During his stay with them he developed some new fruit and vegetable products which have a very good demand in the market.

Shri S. K. Bakshi is an active rotarian. He joined 'Rotary Club', Haldwani (Nainital), U.P., in 1970, and was its Joint Secretary from 1971 to 1972. He has organised many Musical eves, Star nights, Musheras and Kawalies for community service projects for raising funds for Cancer Foundation. He was a member of Rotary Club, Meerut, from 1972-76. He has joined the Rotary Club at Calcutta.

In 1975, he was selected as one of the best and young 'Food Technologist' of India and his name was published in '*Reference Asia*', Vol. I, Asia's First Who's Who of 'Men and Women of Achievements and Distinctions', published by Tradesman and men, India.

He took active part in sports and extra curricular activities. He was the Secretary of the College Union and Dramatic Society. He won J and K State Tennis Championship in 1965; prize for being the best player of the College cricket team in 1964-65; and in 'All India Inter University Youth Festival' in 1962.

Shri Bakshi enjoys Music, stamp collection, swimming and reading literature.

Shri R. A. Varma

Shri Ram Ajore Varma has been working as the Food Specialist at Government Fruit Preservation and Canning Institute, Lucknow, since July 1976.

Shri Varma did B.Sc. (Agriculture) in 1966; Post-Graduate Diploma in Fruit and Vegetable Technology, Lucknow, in 1968 and M.Sc. (Food Technology) in Central Food Technological Research Institute,



Mysore, in 1976. Before joining the Government Fruit Preservation and Canning Institute, he was with S. R. Cannery, Allahabad, for one year as Assistant Chemist.

He has published several papers in various journals on Food Technology.

UPASI Tea Scientific Department

The United Planters' Association of Southern India (UPASI) was established in 1894 and its Tea Scientific Department in 1926. From a modest beginning, the Department which was initially based at Devarshola in Nilgiris moved to Cinchona in the Anamallais and now it completes 50 years of service to the industry during which period its expansion and contributions have been substantial.

The activities of the Department are distributed among its constituent disciplines, viz., Botany, Chemistry, Entomology, Plant Pathology and Technology. Selection and release of improved planting material, chemical control of weeds, evolution of economic manuring programme, control of insects and diseases, study of chemistry of tea clones, and improvements and innovations of manufacturing processes

are the important fields in which the Scientific Department is actively involved. The transfer of scientific knowledge to the planters is being done through five advisory centres at Cinchona, Coonoor, Munnar, Meppadi and Vandiperiyar covering the whole South Indian Tea Industry. 'Planters' Chronicle' is the official journal of the UPASI playing a key role in knowledge transfer. Facilities for testing soil, fertilizers, plant protection chemical, tea samples etc. are being provided to its members.

For financing the annual budget of this Scientific Department, the cess levied by the Association on its members is being augmented by a grant from Indian Tea Board.

Scientists from this research institute work in close liaison with their counterparts in Tocklai, Ceylon, East Africa, Indonesia and elsewhere. The Institute is also collaborating with Central Food Technological Research Institute, Mysore, for knowledge transfer in technological aspects of tea manufacture, especially instant tea; with Indian Institute of Science, Bangalore, for work on tea pigments; with Indian Agricultural Research Institute, New Delhi, for a new microbiological approach to tea nutrition problems and so on. The Department also conducts Annual Scientific Conference which serves as a meeting point of planters and renowned scientists from India and abroad.

The remarkable increase in tea production in South India during the last quarter of a century—it is 115 per cent compared to less than 50 per cent in Sri Lanka—speaks for itself the contribution of this Department.

Indian Veterinary Research Institute, Izatnagar

A new Division known as Division of Avian Diseases has been established during

the 5th Five Year Plan. Dr H. V. S. Chauhan, who was Associate Professor at the Haryana Agricultural University, Hissar, has joined as Head of the Division. There are six more scientists in this new Division. In order to provide quick diagnosis of the Poultry diseases and with a view to serve the growing Indian poultry industry, the creation of this division has been well timed.

Dr Jordon, Associate Professor, Avian Medicines at the University of Liverpool, U.K., arrived at I.V.R.I., Izatnagar, for consultancy work during the 1st week of January 1977. Dr Jordon, a leading Avian Pathologist, will join the I.V.R.I. under the ICAR/UNDP project 'Centre for Advanced Studies in Poultry Sciences'.

A new building to house the Avian Physiology and Reproduction Laboratory has now been built for the Division of Poultry Research during this year. This building will house the modern hatchery, Avian Reproductive Physiology Laboratory, Avian Physiology Laboratory and other allied laboratories.

The Division of Poultry Research has built up a Processing Plant for manufacturing egg powder. This plant is the first of its kind, in the public sector, exclusively meant for teaching and research in dehydration technology for eggs.

Dr K. Mohan, Scientist, working in the Poultry Research Division at Izatnagar, has left for Canada to join the University of Guelph for his Doctoral work in the field of Avian Pathology. He left India on 25th December 1976 under the Commonwealth Fellowship to pursue his studies at Guelph.

A project for developing quails for meat purpose has been prepared at the Division of Poultry Research to evolve the suitable lines of quails for meat. The initial studies have shown encouraging results. It is hoped that within a period of two years I.V. R.I. would be able to evolve suitable strains of quails for meat.

The Southern India Shippers' Association

A meeting of members of the Southern India Shippers' Association was held with Shri M. M. Trivedi, Chairman, East Coast India/West Asia Gulf Conference to discuss shipping problems in the region.

Shri J. Prasad Davids, Secretary, Southern India Shippers' Association (SISA), welcomed the Members. Shri A. L. Lakshmanan, President, Southern India Chamber of Commerce and Industry, was present as a special invitee.

It was noted that the freight rates from Bombay to West Asia are cheaper than freight rates from Madras, even when the goods were taken by road/rail to Bombay. In order to prevent the diversions of trade from this hinterland, it was felt that uniform freight rates should be maintained.

The bunker surcharge from Madras to West Asian ports has been charged at 31 per cent while other conferences have lowered surcharge ranging between 17 per cent and 19.5 per cent.

As far as the availability of space/sailings were concerned, Shri Trivedi felt that the shippers ought to give projections on the availability of cargo in order to enable the conference to plan their operations in advance.

He ruled out the possibility of having uniform freight rates as this would be unacceptable to shippers who are close to the ports of destinations.

CFTRI—Short-Term Course

The Central Food Technological Research Institute will conduct a short-term course in 'Fruit and Vegetable Technology' at the Institute from 25th July to 17th September 1977.

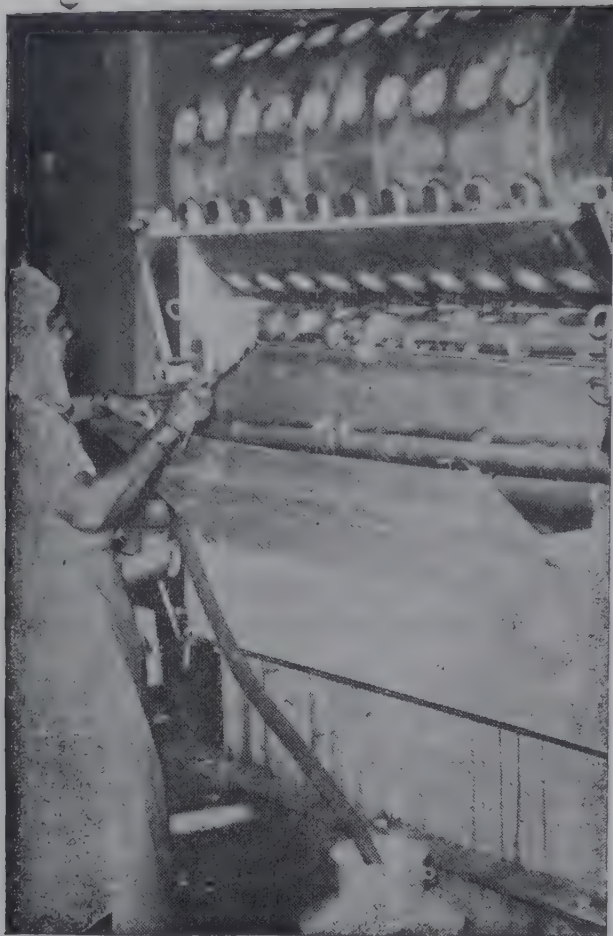
The medium of instruction is English. The tuition fee for the entire course is Rs 300 (exclusive of board and lodging).

The course will be of particular benefit to those directly associated with Fruit and Vegetable Preservation Industry. Candidates should hold a Degree in Science/Agriculture/Technology/Engineering. Preference will be given to candidates sponsored by the food industry, Universities and Research Institutions. Educational qualifications could be relaxed in the case of candidates with exceptional experience in the field.

Application forms for admission can be obtained from the Chairman, Training Centre, Central Food Technological Research Institute, Mysore-570 013, Karnataka, upto 13th June 1977, by sending him a self-addressed and stamped (25 P) envelope of 9" x 4" size together with a non-refundable application fee of Rs 5 by crossed Indian Postal Order in favour of Director, Central Food Technological Research Institute, Mysore-570 013.

The Maharashtra Agro-Industries Development Corporation Ltd.—NOGA

Nagpur is located in the heart of important orange growing areas in the country. The Nagpur Orange Growers' Association (NOGA) has played a very important role both in the orange selling and processing activities for quite some time. NOGA had many firsts to its credits and many important technologists, both from India and abroad, have done pioneering work in processing in this factory. NOGA has survived many ordeals but came through successfully each time. Nagpur Orange Growers' Association went into liquidation in 1969 and the NOGA Factory was taken over by the Maharashtra Agro-Industries Development Corporation and recommissioned in January 1972. The Corporation has very diligently tried to rebuild the image of NOGA products for last four years. A



number of young technologists and experienced workers headed by its General Manager, Shri A. C. Batra and under the dynamic leadership of its Managing Director, Mr K. Rajan, have gone a long way in building up a very good image for NOGA products. Though NOGA has built up a remarkable record in exports and established its name for quality for supply to the Defence forces and civilians, the world recognition at Leipzig Spring Fair 1977 which awarded World Gold Medal to NOGA for its Orange Marmalade came as a crowning success to

the efforts of management, staff and workers of NOGA. The young team of staff that merits mentioning consisted of S/Shri B. M. Suri, P. Misra, Muralidhar, Garg, Ali, Shahu and Yadao, besides experienced workers; Sarvashri Jamnadas and Jagannath. There were many who worked behind the curtain and played very important roles.

The sales team consists of S/Shri P. B. Khanolkar (Sales Manager), Naik and Shetye.



WORLD FAMOUS Mida's

QUALITY PRODUCTS
ARE **NOW** AVAILABLE
IN THE LOCAL MARKET

MANGO CHUTNEYS
PICKLES IN OIL
BENGAL CHUTNEY SAUCE
LA-ORIENT SAUCE
TOMATO SAUCE AND
KETCHUP
WORCESTERSHIRE SAUCE
SQUASHES AND CORDIALS
GUAVA JELLY
MANGO SLICES IN SYRUP
CURRY POWDER
CURRY PASTE ETC.



MIDA & COMPANY PRIVATE LIMITED
POST BOX NO. 498 CALCUTTA - INDIA
PHONE 22 6092



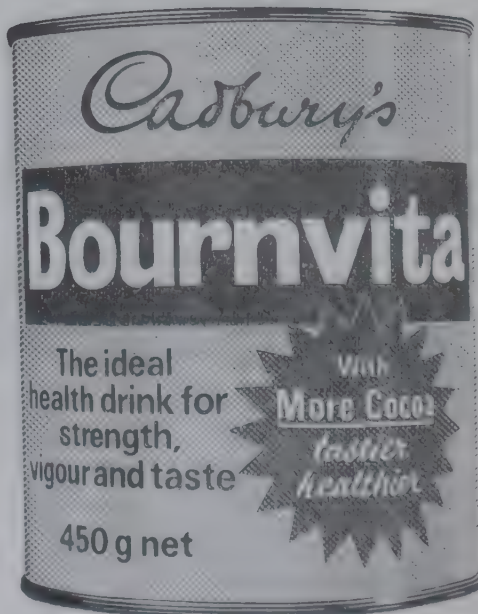
NEW

Bournvita with more cocoa!

Bournvita has always had more cocoa than any other malted health drink. And now, there's even more cocoa in Bournvita to make it more nourishing and more delicious than before!

The cocoa in Bournvita is rich in blood-building iron and contains vitamins B & D as well as valuable mineral salts—like calcium, phosphorus, sodium and potassium. In addition, Bournvita is packed with all the nourishing goodness of malt, milk and sugar. Two teaspoonfuls in a hot cup of milk, make a delicious, nourishing drink.

Give your children Bournvita every day, twice a day. It helps provide them with the precious nourishment they need for their growing bodies. And you need it too...to keep up with them!



SAVE 75 PAISE

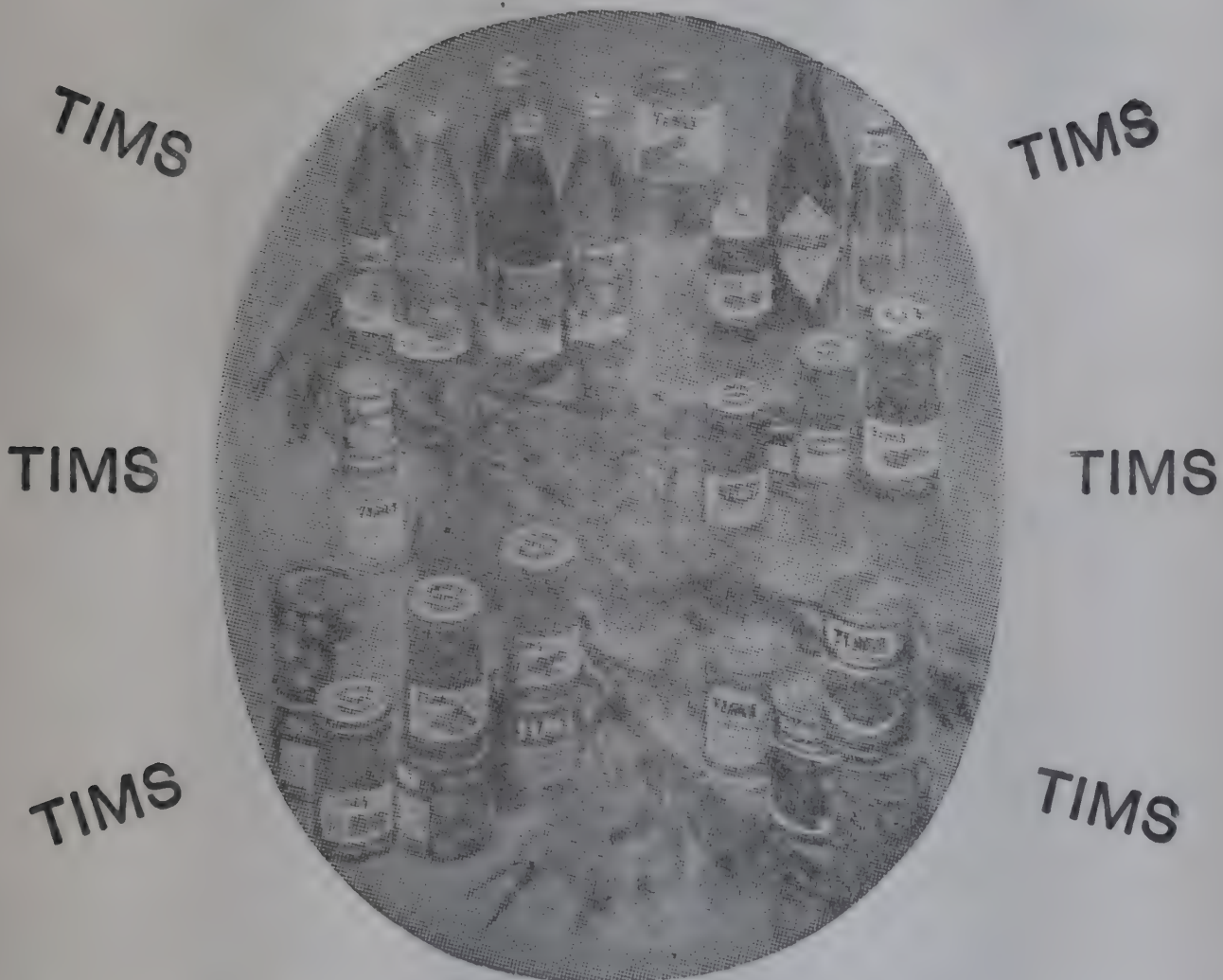
Bournvita is also available in a 450 g. refill pack that saves you 75 paise! On opening this pack please empty its contents immediately into a regular Bournvita tin to preserve its freshness.



Cadbury's
Bournvita
 extra cocoa
 extra energy, extra taste

OBM/6714

TIMI PRODUCTS



A WIDE RANGE OF PROCESSED FOOD

Squashes ● Syrups ● Cordials ● Jams ● Jellies
Fruits ● Juices ● Vegetables ● Tomato Products
Chutney ● Pickles and Curry Powder etc.

**TIMI
PRODUCTS LTD.**

BELGHARIA, CALCUTTA-56 Phone : 611291

CC-1-1/73

KISSAN

NOW OFFERS

ORANGE OIL

(Winterised and Cold Extracted)

In Bulk Quantities

**SUITABLE FOR FOOD, PHARMACEUTICAL
AND SOFT DRINK INDUSTRIES**



For your requirements write to

KISSAN PRODUCTS LIMITED

Post Bag 1676, Bangalore 560 016

INDIA



***Deliciously
yours!...***

Dr. Writer's

Tinned fruit and vegetables. Juices, jams, and marmalades. Syrups, squashes, soups and sauces. Chocolates, confectionery and Macaroni products — a wide and varied range of food products to suit every taste.

Made as only Dr. Writer's can make them — deliciously!

Deliciously yours, Dr. Writer's.

**DR. WRITER'S CHOCOLATES
& CANNING COMPANY**

Behind Bhavani Shankar Road,
DADAR, BOMBAY-28

TALCHERKARS-W-13273



HE CANNOT MISS ACCOS EVEN BLIND FOLD!

If you care for quality canned and dehydrated fruits and vegetables, delicious jams and jellies, tangy syrups and squashes, delectable fruit juices and fruit cocktail, saucy tomato products and palatable pickles and vinegar,

*Always remember your favourite brand **Accos**!*
Also introducing the King of Drinks,

"Ginger Napoleon"

(Fortified with rich Vitamins and a panacea for digestive disorders)

Manufacturers: ALLAHABAD CANNING CO.,
Bamrauli, Allahabad

GRAM: 'BIRLA'
 PHONE: 3035

MAKING

Complete food processing lines from **Mather+Platt**



**Suppliers of complete preparation
and processing lines
on turnkey basis for**

- Bottling of Fruit Juices
- Canning of Fruit Juices
- Special lines for Apple Juice and concentrates, Bottling and Canning
- Special lines for Tomato and Pineapple Juices and concentrates. Bottling and Canning
- Individual Machines for any particular application in the complete lines
- Suppliers of Rotary Pump Fillers for Water, Juices, Oils and Viscous Liquids for small packs as well as bulk packs

MATHER & PLATT LTD., FOOD & PACKAGING MACHINERY DIVISION,
P.O. Box No. 327, Bombay 400 001. Telephone: 269651, Telex: MATHER-BY-3120.

Dipy's

LIVE-HAPPY FOODS



HERBERTSONS LIMITED
Homi Mody Street, Bombay 400 023.

Dipy's colourful packaging has contents just as tempting. All Dipy's products are made from fresh fruits and vegetables. They retain the goodness of natural vitamins. Dipy's delightful range is wide enough to suit all your tastes.

Interpub/HL/2/74

*FOR LOWER COST AND
BETTER RESULTS*

OCEANIC

OFFERS

GARLIC and ONION POWDER

To Manufacturers of:

**TOMATO KETCHUP
SAUCES**

CURRY POWDER

PAPPADS

**CHUTNEY, PICKLES
and BISCUITS**



**OCEANIC DEHYDRATES
PRIVATE LIMITED**

POST BOX NO. 81, BEDESHWAR
JAMNAGAR-361 001

For your requirements of

**PECTIN
LIME JUICE
& LIME OIL**

Please contact:

MANAK CITRUS PRODUCTS PVT. LTD.

UTRAN 425 001

**Dist: Jalgaon
(Maharashtra State)**

Phone: 70 Pachora

**N.R.D.C. Process developed at
Central Food Technological Research Institute, Mysore**

The Weikfield way to the customer's heart—



delicious winning ways!

A wide range of specialized food delicacies and allied products, manufactured to international standards at the modern Weikfield Garden Factory. Weikfield products are used in every home and by leading hotels, catering establishments and the Defence Forces. They find a place in export markets too.

Food Division: Cornflour • Ice-cream Mix • Agar Agar Arrowroot Powder • Glucose D • Pudding Mixes • Icing Mix • Ready Tea and Coffee Mixes • Juice Powders and Instant Whip, etc.

Spice Division: Mustard Powder • Black & White Pepper • Jerola and all other Indian spices and herbs.

Bakery Division: Baking Powder • Cake Flour • Icing Sugar • Baker's Hoppe Mix • Powder Flavours, etc.

Food Dye Division: Edible Supra and Wepcol Food Colours in a wide range.

General Products Division: Emulsifiers • Stabilisers • Laundry Starch • Wep (scouring powder) and detergents, etc.

Weikfield—the taste that's great

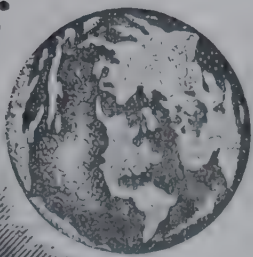
Weikfield Products Company (India) • Nagar Road, Poona 14



Every Hour...



at some place
around the world



Daw Sen's

PICKLES & CHUTNEYS

are served on the table

DAW SEN & CO PRIVATE LTD.

P. O. BOX NO. 9020 CALCUTTA. RETAIL STORE 10 LINDSAY STREET.

"Terrific! Where did you
buy all this from?"

"Buy? I made them myself.
And in practically no time at all!
...Gulab Jamuns, Jilebis,
Idlis and Vadais from
GITS INSTANT FOOD MIXES"



INSTANT FOODS

Sweets:

Gulab Jamun Mix
Jilebi Mix
Shira Mix

Savouries:

Idli Mix
Dosai Mix
Vadai Mix
Pakora (Bhajia) Mix
Sambhar Mix

INSTANT SOUPS

Vegetarian:

Tomato
Cream of Tomato
Mixed Vegetable
Green Peas
Onion

Non-Vegetarian:

Chicken
Cream of Chicken
Chicken Noodle
Chicken & Green Peas
Mutton

PROCESSED FOODS

Minced Mutton
Boneless Bombay Duck
Eggs Noodles

And also:
**PICKLES & SWEET
CHUTNEYS
CURRY POWDER
& SPICES**



Nutritious GITS Instant Foods are
processed with motherly love and care
from pure and fresh ingredients
in the most hygienic environments.

GITS FOOD PRODUCTS (INDIA)
Poona-13

Gits®



**FRUIT PRODUCTS
FARM FRESH AND ECONOMIC**



Range: CANNED PINEAPPLE AND MANGO PRODUCTS, FRUIT COCKTAIL, TOMATO PRODUCTS, PROCESSED PEAS, SQUASHES, JAMS, PICKLES, VINEGAR, GINGER PRESERVE IN SYRUP ETC.



Manufacturers and Exporters:
BHARATH CANNING COMPANY LIMITED
KAUP-574 106 (South Kanara)



**A wide range of
ESSEX FARMS
Canned Products too!**



PORK SAUSAGES, COCKTAIL SAUSAGES, PORK LUNCHEON MEAT, FRANKFURTERS, HAM ROLLS, BACON RASHERS, MUTTON CURRY, CORNED MUTTON, MUTTON KEEMA CURRY, GURDA KAPURA, LIVER CURRY, ROGAN JOSH.

**Available at leading stores and
ESSEX FARMS RETAIL SHOPS
at 4, Mehrauli Road; Safdarjang Enclave;
Super Bazar (Connaught Place) and South Extension.**

ALL INDIA FOOD PRESERVERS' ASSOCIATION

take pleasure in announcing

"Raylon Award" 1977-78

for the innovation of a Machine/Equipment
for use by the Fruit and Vegetable Processing
Industry

Amount of Award	...	Rs 10,000.00
Last date of receipt of application	...	31st December 1977
Presentation of Award	...	April/May 1978
		At the Annual General Meeting of the All India Food Preservers' Association
Date and Venue will be intimated later		

APPLICATION FORM

1. Name and address of the applicant (s)
2. Name of the equipment
 - 2.1 Model No.
Code No.
Purpose/use
 - 2.2 Brief description of the process along with the role played by the equipment
Literature, working pamphlet and photograph of the equipment
 - 2.3 Is it a prototype or working equipment/machinery
 - 2.4 Improvements carried out after first introduction
 - 2.5 Deficiencies of the equipment and how are they overcome in the new design
 - 2.6 Any additional advantages of the new design
 - 2.7 Working principles and operation
 - 2.8 Power requirements and space requirement
 - 2.9 Ex-works price
 - 2.10 Flexibility and versatility of equipment
 - 2.11 Names and addresses of the fruit and vegetable processing units who are using the equipment
 - 2.12 How many machines are in use in the country and abroad
 - 2.13 Have you previously applied for an award for this equipment elsewhere. Give details
 - 2.14 Is it a copy of existing Indian or Foreign made Machine/Equipment or an original idea
 - 2.15 Capacity, efficiency and cost compared to original equipment

- 2.16 Advantages of the equipment in reducing processing cost.
- 2.17 National importance of the machine
Import substitution
- 2.18 Export potential
- 2.19 Estimated number of machines required to meet national needs
- 2.20 Any other plus point justifying claim for the award

Please forward the application form completed with full details and enclosures along with registration fee of Rs 10 per each entry to :

V. B. OBEROI

(Convener)

**“RAYLON AWARD” Sub-Committee
ALL INDIA FOOD PRESERVERS' ASSOCIATION**

C/o Kissan Products Limited

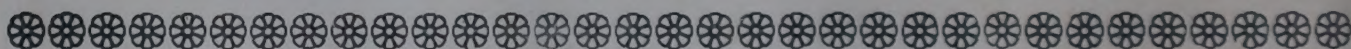
Old Madras Road

Bangalore-560 016

The information will be kept in confidence.

The deliberation of the judging committee will be held in camera.

The decision of the judging committee will be final.



ALL INDIA FOOD PRESERVERS' ASSOCIATION

ANNOUNCE THE FOLLOWING AWARDS

for 1977

Vol. XXXI, INDIAN FOOD PACKER

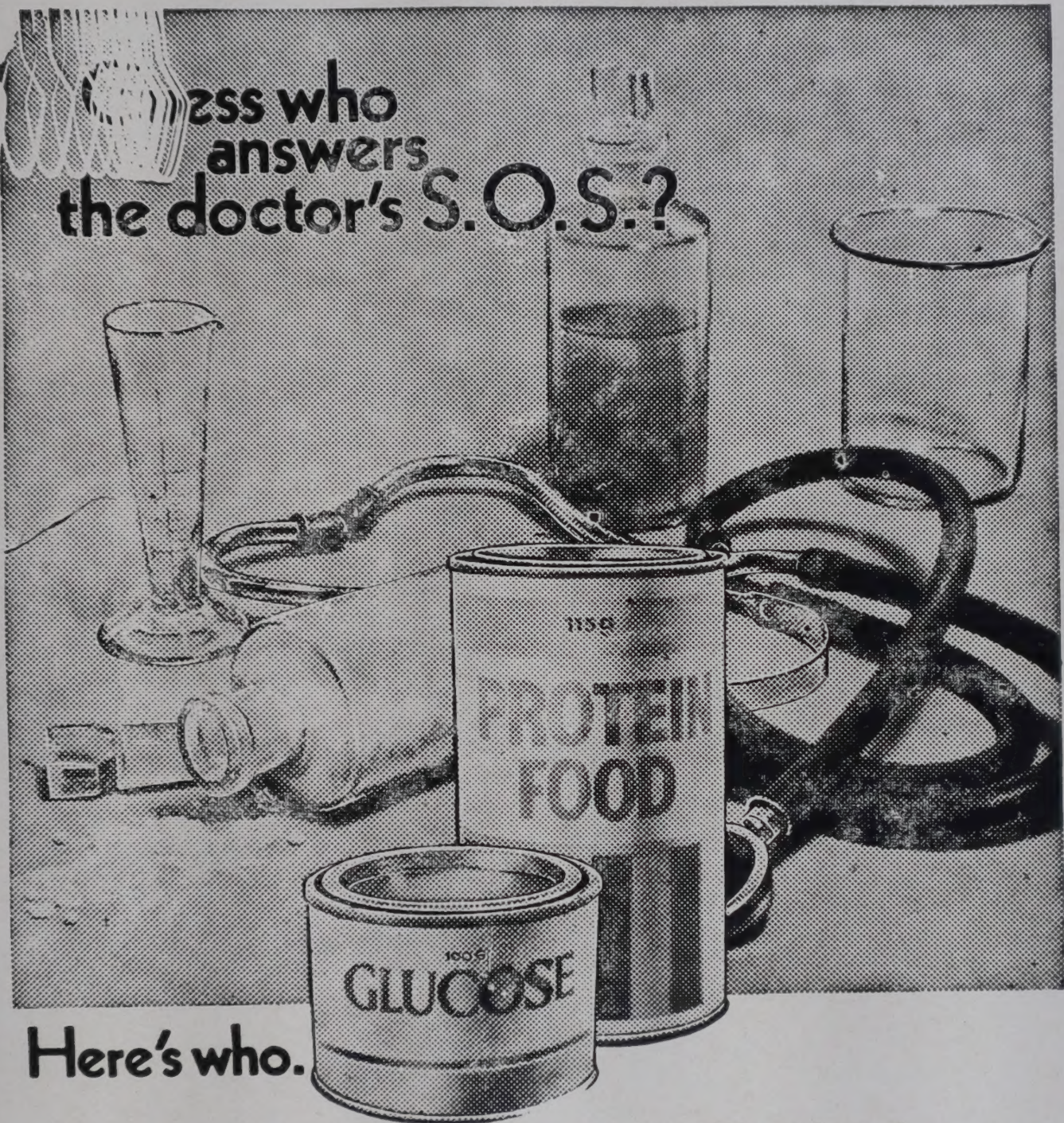
K. U. Patel *Memorial* Award (Rs. 1,000) donated by All India Food Preservers' Association for the Best Paper.

N. N. Mohan *Memorial* Award (Rs. 1,000) donated by House of Mohmeak's for the best Research Paper.

Yezdi Award (Rs. 1,000) donated by F. K. Irani, Chairman and Managing Director, Yezdi Distilleries, Mysore, for the paper which has a bearing on the research and development of new products.



Who answers
the doctor's S.O.S.?



Here's who.

Right now somewhere, somebody is swallowing a tablet.

You don't even realise it but our cans have been helping to bring you the things you use every day: pharmaceuticals, cosmetics, fruits, fish, baby foods, ghee and vanaspati, paints, motor-oils. All with their quality intact.

Our way of doing it is with the most modern technology.

We are an associate of the world's largest can manufacturer, the American Can Company. Through us, the fruits

of their over \$ 20,000,000 annual research and development programme are available to canners and consumers in India.

Which means, better and more cans for you, naturally.

Things you can't do without, Poysha can



POYSHA
INDUSTRIAL CO. LTD.

Bombay • Ghaziabad • Cochin
Subsidiaries: Kaira Can Co. Ltd., Anand
Colrige Ltd., Bombay

Be canny



Ask Metal Box

for packaging in paper, plastics, polyethylene, aluminium, composites, not to mention tinplate—our first and continuing interest.

Ask for incisive analysis of your particular problems. For plant layouts, operator training and market analyses. For cost-efficient alternatives, special lacquers, export quality printing and design. For packaging and package-making machinery, formerly imported.

Metal Box can supply the whole works, and much of it free of cost.



things are happening at Metal Box
—much more than metal boxes